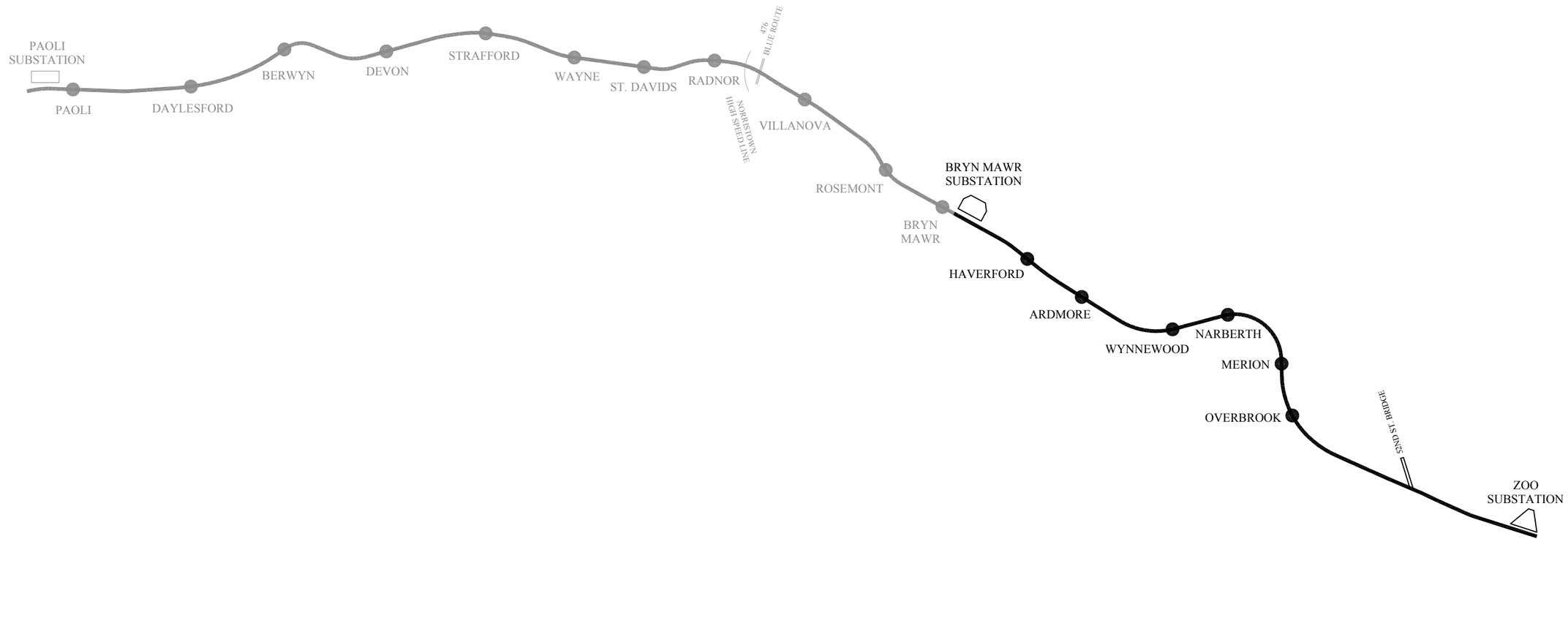
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION



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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GENERAL DRAWINGS
COVER SHEET

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Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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271 OF 347	ET-4124	BORING LOCATION PLAN - STA. 340+70 TO 309+00
272 OF 347	ET-4126	BORING LOCATION PLAN - STA. 278+00 TO 247+50
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336 OF 347	C-0218	TREE PRUNING - STA. 526+00 TO 495+50
337 OF 347	C-0219	TREE PRUNING - STA. 495+50 TO 465+00
338 OF 347	C-0220	TREE PRUNING - STA. 465+00 TO 434+00
339 OF 347	C-0221	TREE PRUNING - STA. 434+00 TO 403+00
340 OF 347	C-0222	TREE PRUNING - STA. 403+00 TO 372+50
341 OF 347	C-0223	TREE PRUNING - STA. 372+50 TO 340+70
342 OF 347	C-0224	TREE PRUNING - STA. 340+70 TO 309+00
343 OF 347	C-0225	TREE PRUNING - STA. 309+00 TO 278+00
344 OF 347	C-0226	TREE PRUNING - STA. 278+00 TO 247+50
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346 OF 347	C-0228	TREE PRUNING - STA. 217+00 TO 186+00
347 OF 347	C-0232	TREE PRUNING - TYPICAL TREE PRUNING DETAIL

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AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GENERAL DRAWINGS
INDEX OF DRAWINGS (SHEET 3 OF 3)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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ET–0003

DIVISION OF WORK AND MATERIALS

ITEM	DESCRIPTION	MATERIALS	FABRICATION	INSTALLATION
1.	INSTALL FOUNDATIONS FOR POLES AND DOWN GUY ANCHORS	C	C	C
2.	INSTALL TRANSMISSION/CATENARY POLES AND CROSS BEAMS	C	C	C
3.	STRING 138 kV CONDUCTORS AND STATIC (TEMP. DEADEND AT SP–16A, 52nd ST)	C	C	C
4.	INSTALL SIGNAL POWER CABLES	C	C	C
5.	INSTALL SIGNAL POWER CUT SECTIONS (6900/120V XFMR's)	C	C	C
6.	INSTALL SIGNAL POWER CUT SECTION CONTROLS AT INTERLOCKINGS	A	A	A
7.	TRANSFER OPGW (FOG) WIRE TO NEW STRUCTURES	C	C	C
8.	TRANSFER CATENARY SUPPORTS TO NEW STRUCTURES	A	A	A
9.	ADJUST CATENARY PROFILES AND RE–HANGER CATENARY	A	A	A
10.	CONNECT ZOO SUBSTATION SIGNAL POWER CABLES	A	A	A
11.	CUT OVER 6.9 kV SIGNAL POWER BEWTEEN BRYN MAWR AND ZOO SUBSTATIONS	A	A	A
12.	CUT OVER 138 kV TRANSMISSION BETWEEN BRYN MAWR AND 52nd STREET	A	A	A
13.	DEMOLISH AND REMOVE EXISTING CATENARY STRUCTURES	C	C	C

A – AMTRAK
C – CONTRACTOR

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National Railroad Passenger Corporation
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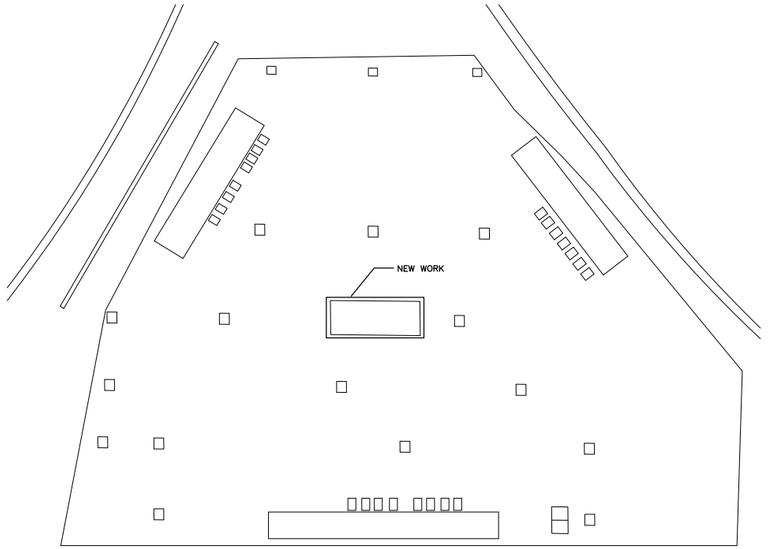
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

GENERAL DRAWINGS – DIVISION OF WORK
TRANSMISSION AND CATENARY

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ET–0010



ZOO SUBSTATION

ZOO SUBSTATION: DIVISION OF WORK AND MATERIALS

ITEM	DESCRIPTION	MATERIALS	FABRICATION	INSTALLATION
1.	REPLACE EXISTING 3300V TRANSFORMER WITH NEW 6900V TRANSFORMER.	C	C	C
2.	CONNECT 6900V SIGNAL POWER CABLES.	A	A	A
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

A – AMTRAK
C – CONTRACTOR
U – UTILITY

1 / ET–0011 DIVISION OF WORK: ZOO SUBSTATION
SCALE: NONE

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
GENERAL DRAWINGS – DIVISION OF WORK
PAOLI & ZOO SUBSTATIONS

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ET–0011

ABBREVIATIONS

A	AMPERE, AMMETER
AB	AIR BREAK
AC	ALTERNATING CURRENT
AL	ALUMINUM
ANN	ANNUNCIATOR
AS	AMMETER SWITCH
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
B	BUS
BKR	BREAKER
℄	CENTERLINE
CANTIL.	CANTILEVER
CND, C	CONDUIT
CKT	CIRCUIT
CTB	CURRENT TEST BLOCK
CS	CONTROL SWITCH
CU.	COPPER
CUB	CUBIC
CW	CONTACT WIRE
C&S	COMMUNICATION & SIGNAL
DC	DIRECT CURRENT
DE	DEAD END
DEFL.	DEFLECTOR ASSEMBLIES
DISC	DISCONNECT
DPDT	DOUBLE POLE DOUBLE THROW
DWG.	DRAWING
E	EAST
EBHS	EAST BOUND HOME SIGNAL
EL., ELEV	ELEVATION
ET	ELECTRIC TRACTION
EXIST.	EXISTING
F	FAHRENHEIT, FEEDER
FD	FIRE/SMOKE DETECTOR
FRE	FIBERGLASS REINFORCED EPOXY
FS	FAR SIDE
FT	FEET
FTAB	FULL TENSION AIR BREAK
FU	FUSE
FUT	FUTURE
GALV.	GALVANIZED
GEN, G	GENERATOR
GND, GRD	GROUND
GRS	GALVANIZED RIGID STEEL
HTAB	HALF TENSION AIR BREAK
HD	HARD DRAWN
HDG	HOT DIP GALVANIZED
HP	HORSEPOWER
HSSI	HIGH SPEED SECTION INSULATOR
HS	HIGH STRENGTH
HT.	HEIGHT
HTR	HEATER
HZ	HERTZ
IC	INTERRUPTING CAPACITY
IL	INTERLOCKING LIGHTING
ISC	INTERRUPTING & SHORT CURRENT RATING
JB	JUNCTION BOX
KV	KILOVOLT
KW	KILOWATT
KVA	KILOVOLT–AMPERE
LA	SURGE/LIGHTNING ARRESTER
LBS	POUND
LG	LONG
LO	LOCKOUT
LOC	LOCATION
LS	LIMIT SWITCH
LV	LOW VOLTAGE
MAX.	MAXIMUM
MCM, KCMIL	THOUSAND CIRCULAR MILLS
MH	MANHOLE
MIN.	MINIMUM
ML	MAINLINE
MP	MILE POST

ABBREVIATIONS (CONTINUED)

M.G.	MOTOR GENERATOR
MS	MOTOR STARTER
MOD	MOTOR OPERATED DISCONNECT
MV	MEDIUM VOLTAGE
NTS	NOT TO SCALE
NIC	NOT IN CONTRACT
N.C.	NORMALLY–CLOSED
NEG, N	NEGATIVE
NEUT	NEUTRAL
NG	NATURAL GAS
N.O.	NORMALLY–OPEN
NS	NEAR SIDE
OCS	OVERHEAD CONTACT SYSTEM
O.H.	OVERHEAD
OOR	OUT OF RUNNING
OOS	OUT OF SERVICE
P	POLE
PB	PULL BOX, PUSH BOTTON
PDS	POWER DISTRIBUTION SYSTEM
PL.	PLATE
PNL	PANEL
PO	PULL OFF
POP	PULL OFF POLE
PORC.	PORCELAIN
POS, P	POSITIVE
PR	POINT OF RISE
PS	POINT OF SWITCH
PSI	POUND PER SQUARE INCH
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
QTY.	QUANTITY
REF.	REFERENCE
REQ'D	REQUIRED
RGS	RIGID GALVANIZED STEEL
ROW	RIGHT OF WAY
SED	STRUCTURE ERECTION DIAGRAM
SHP	SWITCH HEATER PANEL
SHUS	SWITCH HEATER UNIT SUBSTATION
SIG	SIGNAL
SPCS	SIGNAL POWER CUT SECTION
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
STA.	STATION
STD.	STANDARD
STR.	STRUCTURE
SW	SWITCH
SWGR	SWITCHGEAR
T	TROLLEY
TB	TERMINAL CABLE
TBR	TO BE REMOVED
TC	TEL CABLE
THR'D	THREADED
T/F	TOP OF FOUNDATION
T.O.	TURNOUT
TP	TRACTION POWER
T/R	TOP OF RAIL
TRK.	TRACK
TS	TEST SWITCH
TYP.	TYPICAL
V	VOLT, VOLTMETER
VA	VOLT–AMPERE
VT	VOLT TRANSFORMER
W	WEST, WIRE
WBHS	WEST BOUND HOME SIGNAL
W/	WITH
W/O	WITHOUT
W/R	WIRE RUN
X, XFMR	TRANSFORMER
X/O	CROSS OVER
X/O TRK	CROSS OVER TRACK
#	POUND

GENERAL LEGEND

- EXISTING
- NEW
- PROPERTY OR R.O.W. LINE
- UNDERGROUND CONDUITS OR DUCTBANK
- OVERHEAD WIRES
- UNDERGROUND ELECTRICAL
- PROPOSED FENCELINE
- REFERENCE A– DETAIL/REFERENCE b– SHEET #
- SECTION CUT A– DETAIL/REFERENCE b– SHEET #

CATENARY LEGEND

- SECTION BREAK
- IN–LINE INSULATOR
- DEAD END ASSEMBLY
- TRACK ℄
- DE–ENERGIZED WIRE
- ENERGIZED WIRE–TRACK O/S
- WIRE DEAD END
- GROUND
- IN–LINE INSULATORS
- IN–LINE INSULATORS WITH AIR GAP
- CROSS TRACK FEEDER
- CROSS CATENARY STRUCTURE
- K–FRAME PORTAL STRUCTURE
- HSSI — HIGH SPEED SECTION INSULATOR
- FULL TENSION AIR BREAK
- HALF TENSION AIR BREAK
- OUT OF RIDING WIRE
- STRUCTURES TO BE MODIFIED OR DEMOLISHED.
- PLAIN SIDE / RIGHT OF WAY SIDE (R) / TRACK SIDE (T) / STEP SIDE (P, S)
- ANCHOR

ELECTRICAL LEGEND

SINGLE–LINE DIAGRAMS

- MEDIUM–VOLTAGE MOTOR–OPERATED SWITCH NORMALLY CLOSED
- MEDIUM–VOLTAGE MOTOR–OPERATED SWITCH NORMALLY OPEN
- MEDIUM–VOLTAGE HAND–OPERATED SWITCH NORMALLY CLOSED
- MEDIUM–VOLTAGE HAND–OPERATED SWITCH NORMALLY OPEN
- 52 OR — MEDIUM–VOLTAGE CIRCUIT BREAKER
- MEDIUM–VOLTAGE DRAWOUT CIRCUIT BREAKER
- LOW–VOLTAGE DRAWOUT CIRCUIT BREAKER
- LOW–VOLTAGE CIRCUIT BREAKER
- LOW–VOLTAGE ENCLOSED CIRCUIT BREAKER
- AUTOMATIC TRANSFER SWITCH (ATS)
- OR — DISCONNECT SWITCH KNIFE BLADE DISCONNECT SWITCH
- 112.5KVA, 480V, 208/120V — TRANSFORMER DELTA PRIMARY, WYE SECONDARY
- CONV. — CONVERTER
- MS — SYNCHRONOUS MOTOR STARTER
- FUSED SWITCH
- OR — FUSE
- SPARK GAP SURGE ARRESTOR
- METAL OXIDE VARISTOR (MOV) SURGE ARRESTOR
- GROUND
- Z — IMPEDANCE BOND
- M — MOTOR
- G — GENERATOR
- MOTOR STARTER
- OR — CABLE TERMINATION
- SEPARABLE CONNECTOR
- BATTERY
- DC SHUNT
- ELECTRIC UTILITY CONNECTION
- SPCS — SIGNAL POWER CUT SECTION

ELECTRICAL LEGEND

TWO–LINE DIAGRAMS

- MEDIUM–VOLTAGE TWO–POLE MOTOR–OPERATED HORN–GAP LINE AND GROUND SWITCH
- MEDIUM–VOLTAGE TWO–POLE HAND–OPERATED SWITCH
- OR — MEDIUM–VOLTAGE TWO–POLE CIRCUIT BREAKER
- TRANSFORMER / POTENTIAL TRANSFORMER
- LOW–VOLTAGE TWO–POLE CIRCUIT BREAKER

RELAYING, CONTROL AND INSTRUMENTATION DIAGRAMS

- 50 — RELAY OPERATING COIL NUMBER DESIGNATES RELAY TYPE
- SUPERVISORY RELAY
- FUNCTIONAL INTERCONNECTION AMONG CONTROL, PROTECTIVE, AND POWER DEVICES (ARROW DENOTES DIRECTION OF CONTROL)
- TD — TEST DEVICE
- TRIP — CONTROL LINE INTERCONECTION
- CURRENT TRANSFORMER
- POTENTIAL TRANSFORMER
- V, VM — VOLTMETER
- VS — VOLTMETER SWITCH
- A, AM — AMMETER
- –K– — KEY INTERLOCK
- –E– — ELECTRICAL INTERLOCK
- R — INDICATING LIGHT: R–RED, G–GREEN, A–AMBER, W–WHITE, C–CLEAR, B–BLUE
- CONTACTOR (N.O.)
- CONTACTOR (N.C.)
- MOMENTARY PUSHBUTTON
- DIODE
- PILOT LIGHT
- RES OR — RESISTOR
- RESISTIVE HEATER
- GROUND DETECTOR
- LIMIT SWITCH (N.O.)
- NOTC — NORMALLY OPEN TIMEDELAY CLOSE CONTACTOR
- NCTO — NORMALLY CLOSE TIMEDELAY OPEN CONTACTOR

ELECTRICAL LEGEND

PLAN SYMBOLS

- LIGHTING FIXTURE
- LOW–VOLTAGE PANELBOARD
- LIGHTNING MAST

ANNOTATION

- XX — CABLE #
- 2–750kCMIL — QUANTITY AND SIZE OF CABLES
- SINGLE CONDUCTOR WIRING IN PANELS
- MULTI–CONDUCTOR CABLES TO OTHER DEVICES

GENERAL NOTES

1. PERFORM WORK IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL CODES AND REGULATIONS PERTAINING TO THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970. PERFORM WORK IN ACCORDANCE WITH THE NATIONAL RAILROAD PASSENGER CORPORATION'S (AMTRAK'S) SPECIFICATIONS REGARDING SAFETY AND PROTECTION OF RAILROAD TRAFFIC AND PROPERTY (LATEST VERSION).
2. EXAMINE THE SITE AND VERIFY CONTROLLING PHYSICAL CONDITIONS, CONSTRUCTION DATA AND UTILITIES.
3. BRING TO THE ATTENTION OF THE ENGINEER ANY DISCREPANCIES WITHIN THE DRAWINGS, SPECIFICATIONS, CODES OR STANDARDS FOR CORRECTIVE ACTION PRIOR TO PROCEEDING WITH CONSTRUCTION.
4. FIELD CHANGES TO THE STRUCTURES REQUIRE PRIOR ENGINEERING REVIEW AND WRITTEN CONFIRMATION.
5. ALL CONSTRUCTION WORK SHALL BE PERFORMED BY QUALIFIED, EXPERIENCED PERSONNEL.
6. VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION. IF FIELD CONDITIONS PROHIBIT USE OF THE CONTRACT DRAWING DESIGN DETAILS, SUBMIT ALTERNATE DESIGN DETAILS FOR APPROVAL BY THE ENGINEER.
7. BEFORE COMMENCEMENT OF WORK, CONTRACTOR SHALL CONFIRM AND ESTABLISH WITH AMTRAK THE EXACT SEQUENCES AND PROCEDURES TO BE UTILIZED BASED ON MANPOWER, EQUIPMENT, MATERIAL AND TRACK AVAILABILITY.
8. CONTRACTOR SHALL PROTECT ALL EXISTING AMTRAK FACILITIES WHETHER EXPLICITLY SHOWN OR NOT.

DEVICE TABLE

21	DISTANCE RELAY
27	UNDERVOLTAGE RELAY
27C	UNDERVOLTAGE RELAY – LOW CONTROL POWER VOLTAGE
27B	UNDERVOLTAGE RELAY – DC CONTROL POWER OUTPUT FAILURE
27A	UNDERVOLTAGE RELAY – BATTERY CHARGER AC INPUT FAILURE
47	PHASE BALANCE VOLTAGE RELAY
50	INSTANTANEOUS OVERCURRENT RELAY
51	TIME OVERCURRENT RELAY
52	AC CIRCUIT BREAKER
62	TIMING RELAY, JD BREAKER FAILURE
67	DIRECTIONAL OVERCURRENT RELAY
74	SUMMARY ALARM
86	LOCKOUT RELAY
87	DIFFERENTIAL RELAY
94	ANTIPUMPING RELAY
89	DISCONNECT SWITCH
AM	AMMETER
VM	VOLT METER
FM	FREQUENCY METER
LB	BUS SIDE DISCONNECT
LC	LINESIDE CABLE DISCONNECT
T	TROLLEY/TRANSFORMER
F	FEEDER
B	BUS
R	RAIL/RETURN

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OFFICE OF
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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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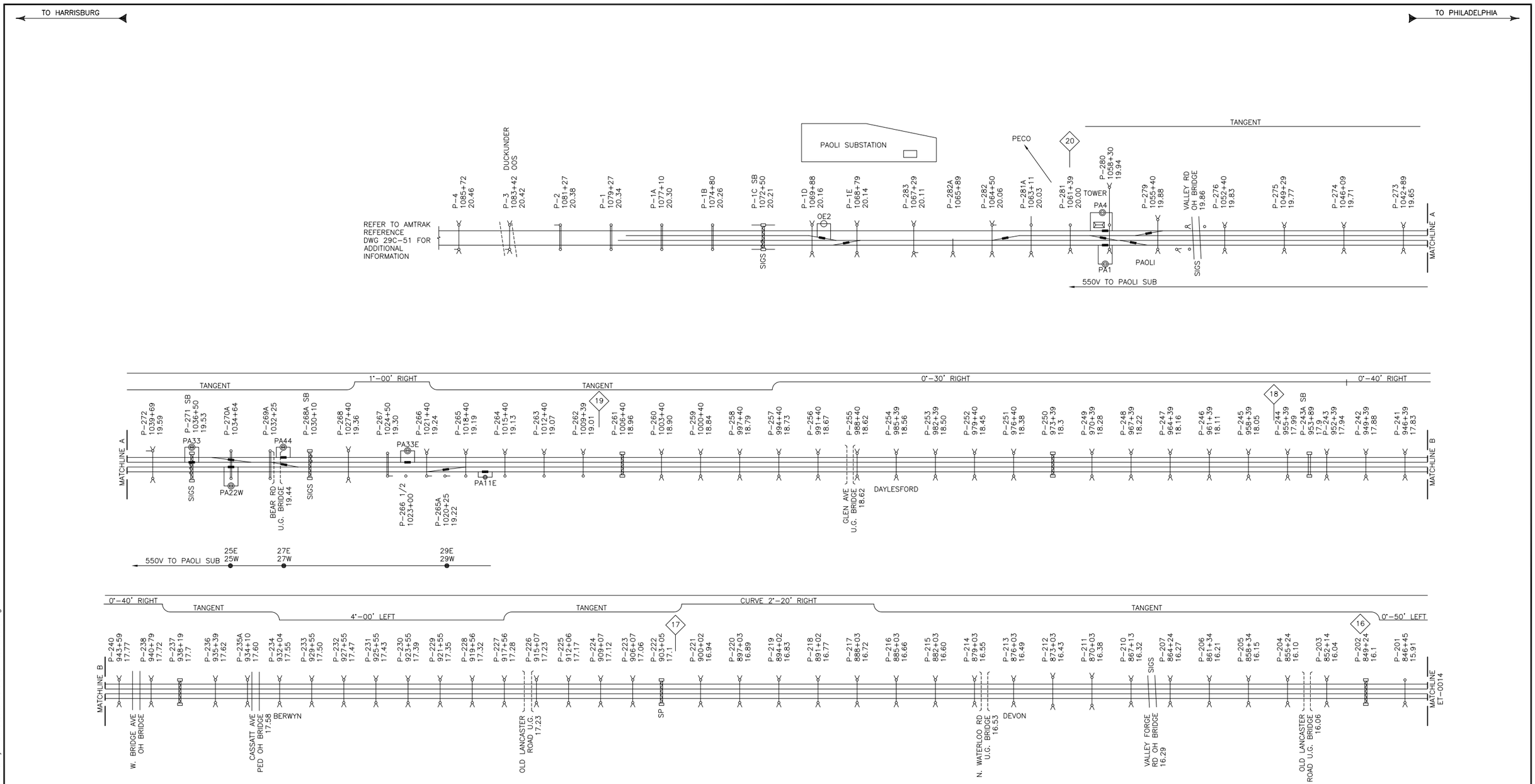
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GENERAL DRAWINGS
GENERAL NOTES, LEGEND AND ABBREVIATIONS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	

File No.:	2011–059–ET–0012.DWG
Ref. No.:	2011–059
Sheet No:	007 OF 347

ET–0012

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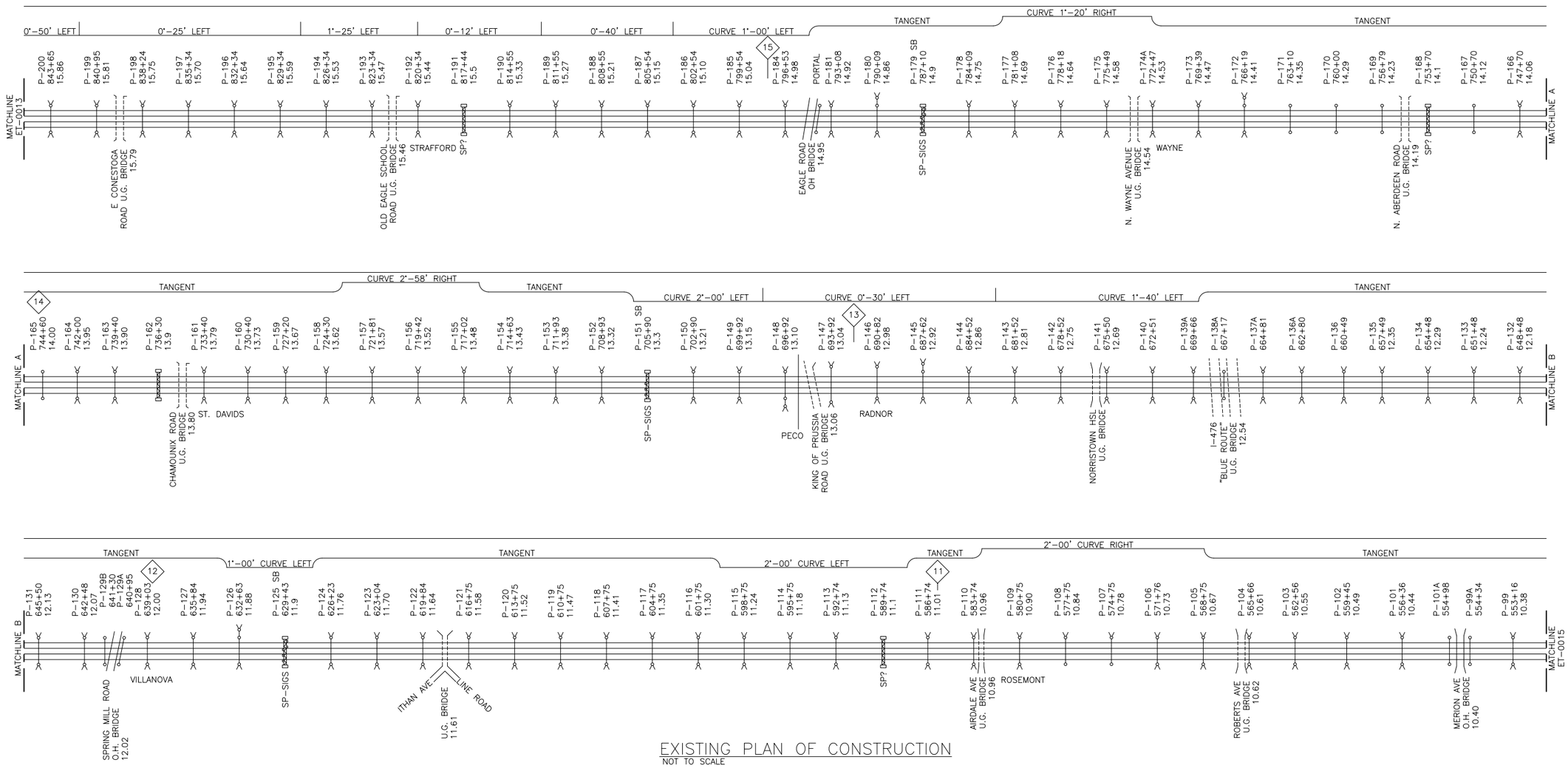
EXISTING PLAN OF CONSTRUCTION SHEET 1 OF 4

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-0013.DWG
Ref. No.:	2011-059
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ET-0013

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EXISTING PLAN OF CONSTRUCTION
SHEET 2 OF 4

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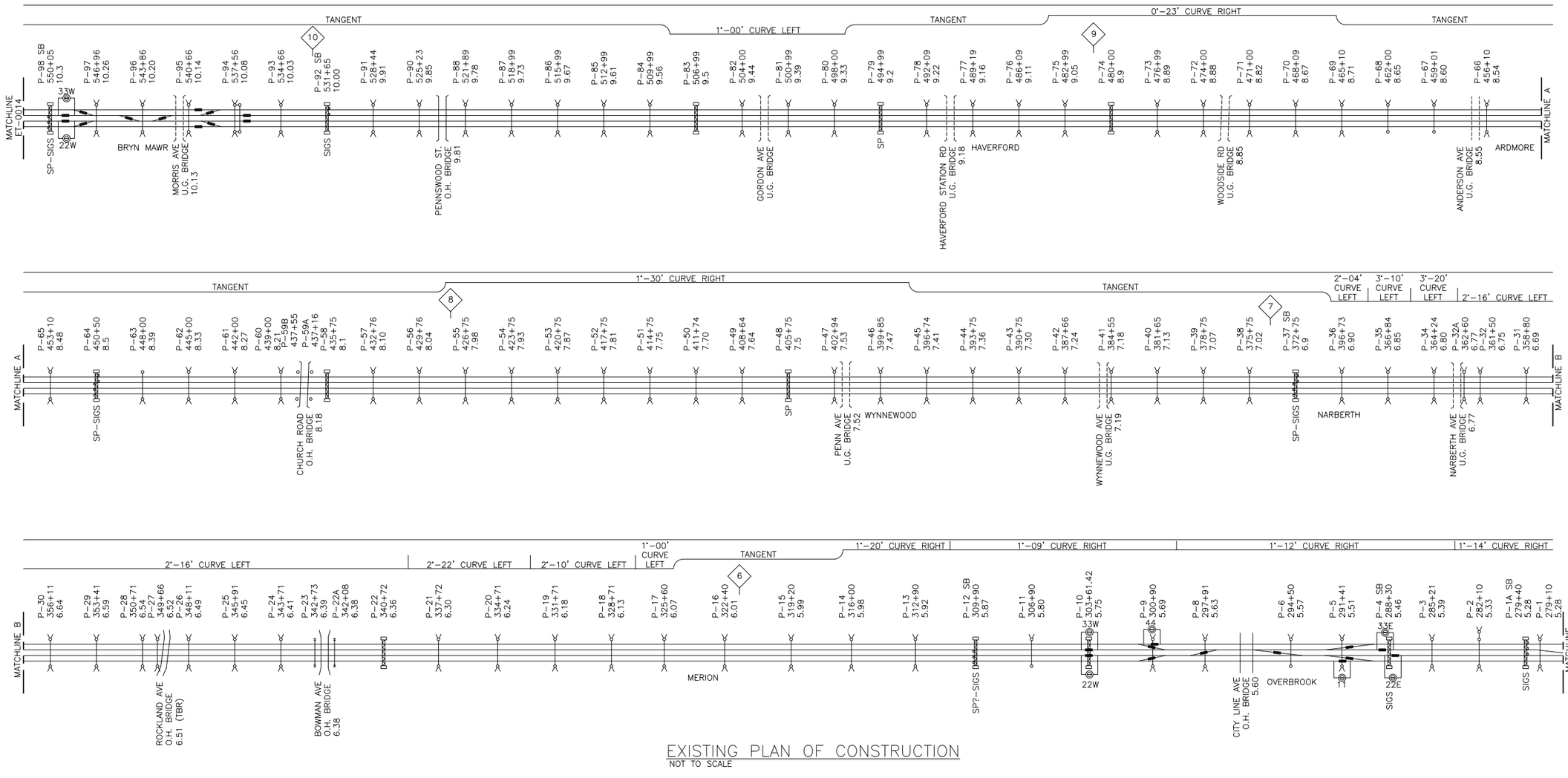
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TO HARRISBURG

TO PHILADELPHIA



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EXISTING PLAN OF CONSTRUCTION
SHEET 3 OF 4

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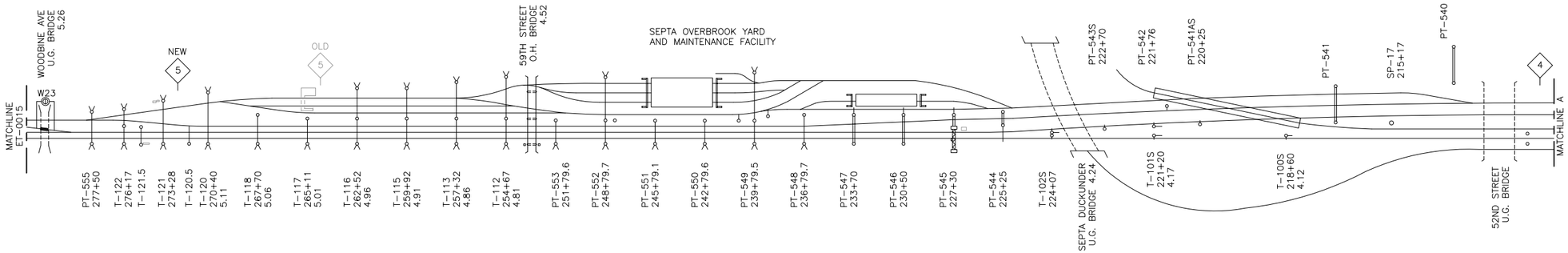
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Ref. No.:	2011-059
Sheet No:	010 OF 347

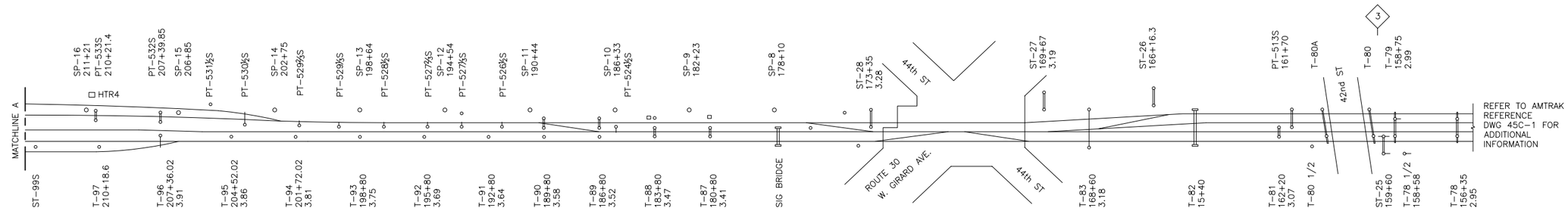
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ELECTRIFICATION
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SHEET 4 OF 4

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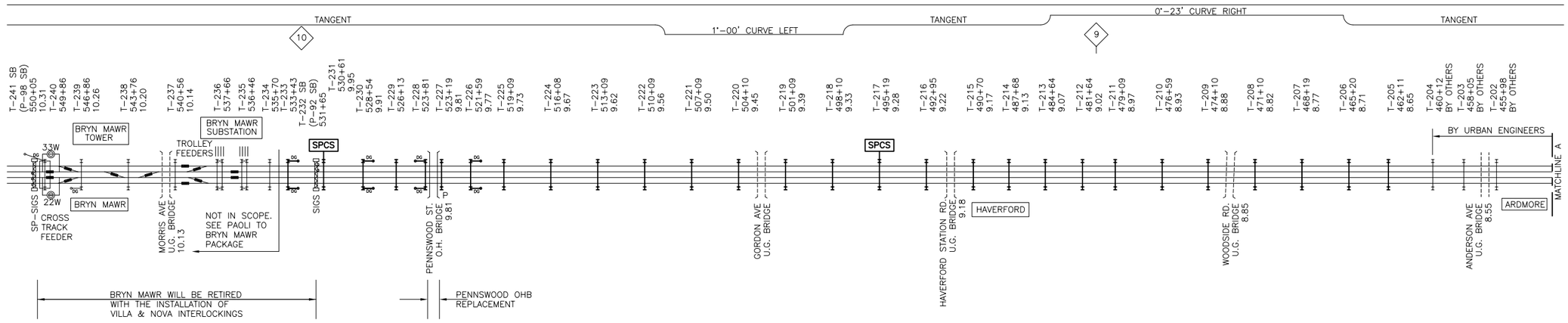
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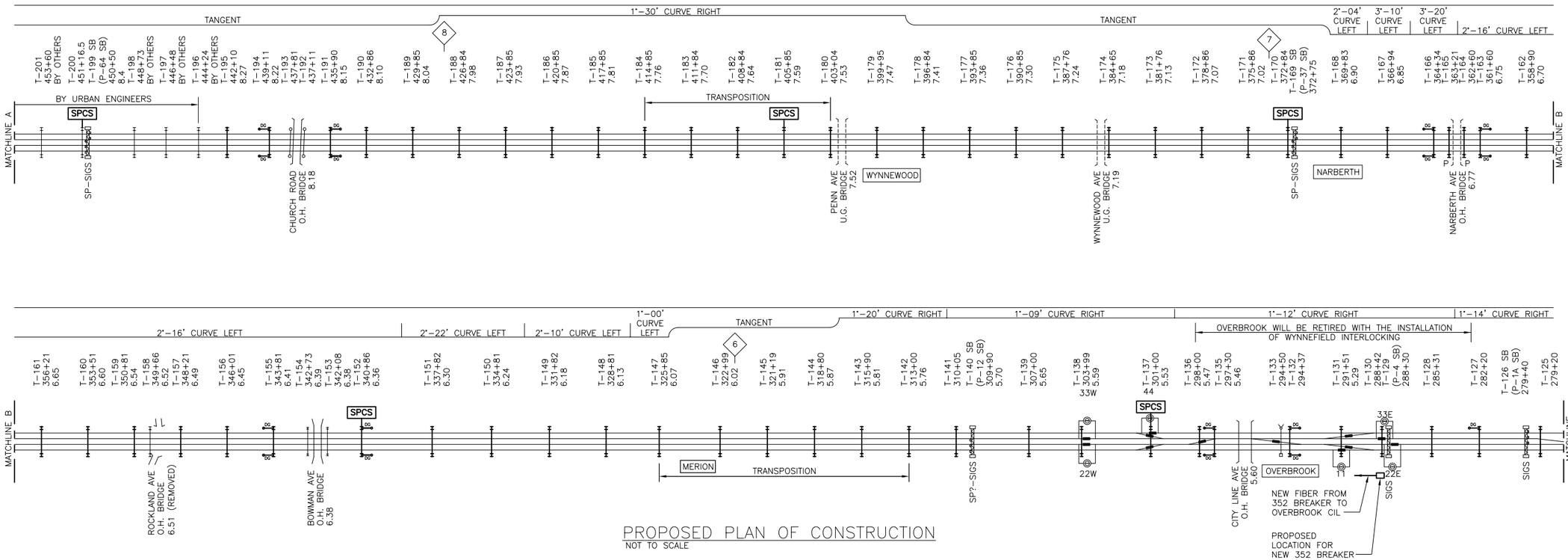
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TO HARRISBURG

TO PHILADELPHIA

SWITCH TABLE	
SWITCH	STRUCTURE
33W	T–240
22W	T–240
33W	T–138
22W	T–138
44	T–137
11	T–131
33E	T–130
22E	T–130





PROPOSED PLAN OF CONSTRUCTION

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

PROPOSED PLAN OF CONSTRUCTION SHEET 1 OF 2

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–0019.DWG
Ref. No.:	2011–059
Sheet No:	012 OF 347

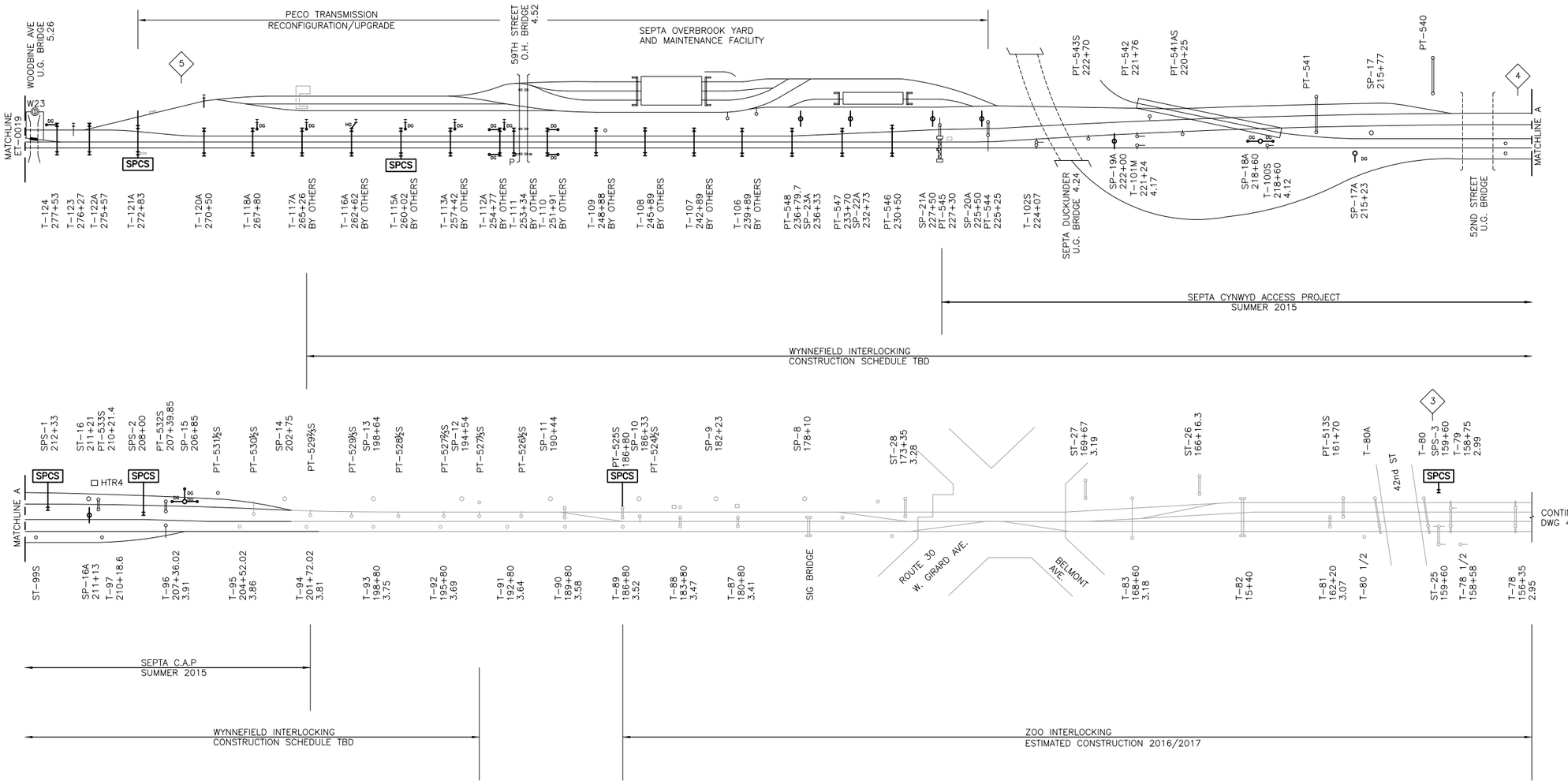
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TO HARRISBURG

TO PHILADELPHIA

SWITCH TABLE	
SWITCH	STRUCTURE
W23	T-124



PROPOSED PLAN OF CONSTRUCTION

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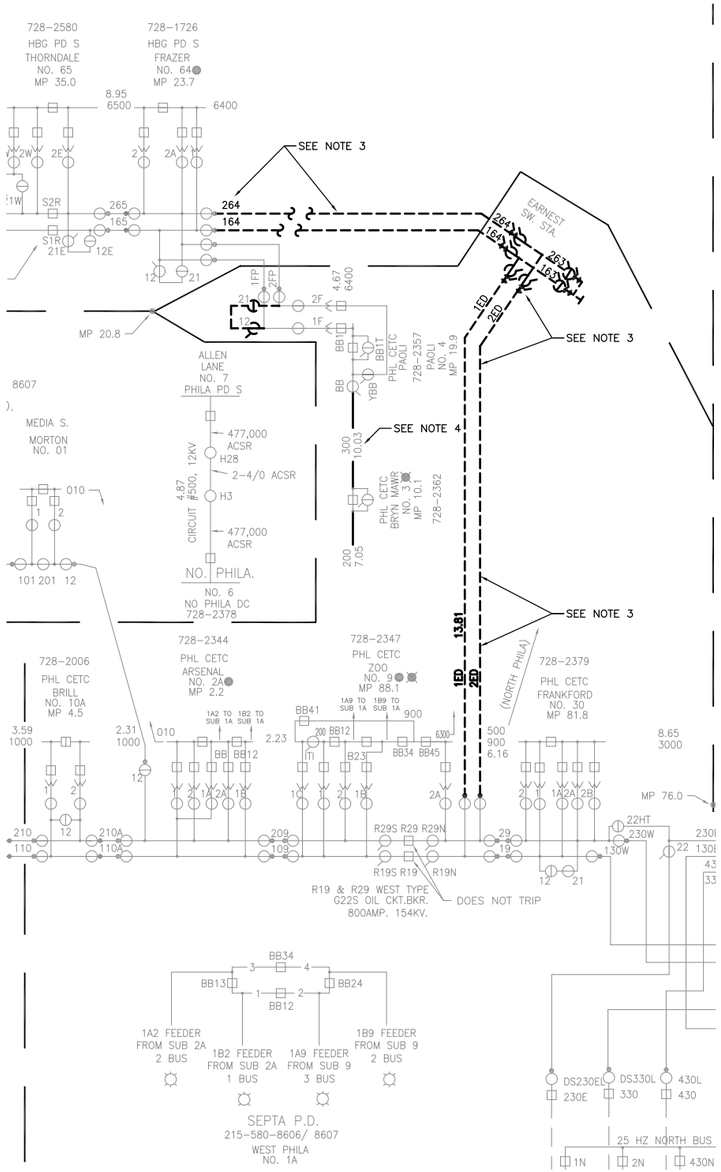
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
PROPOSED PLAN OF CONSTRUCTION
SHEET 2 OF 2

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

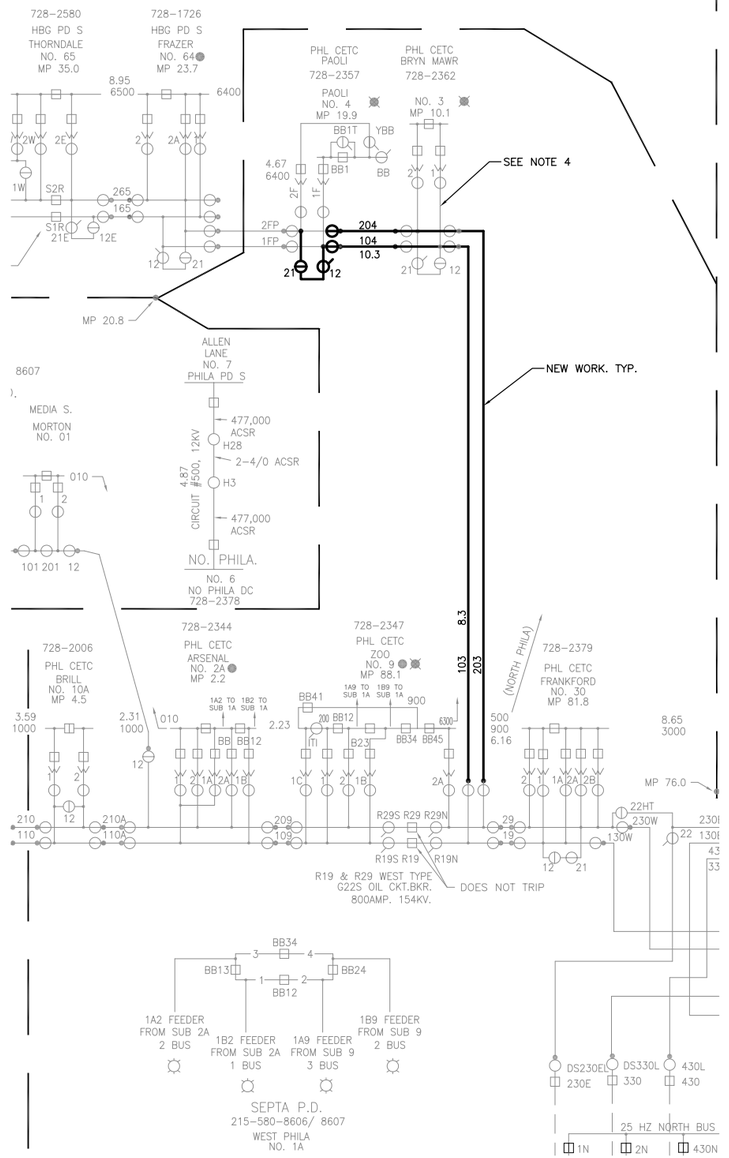
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Ref. No.:	2011-059
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ET-0020

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1 ET-0021 138kV OPERATING SYSTEM -DEMOLITION
SCALE: NONE



2 ET-0021 138kV OPERATING SYSTEM - PROPOSED
SCALE: NONE

LEGEND:

PSE&G D.C.	= PUBLIC SERVICE ELECTRIC & GAS DIRECT CONTROL
SCADA	= SUPERVISORY CONTROL AND DATA ACQUISITION
CETC	= CENTRALIZED ELECTRIFICATION AND TRAFFIC CONTROL
PHL LD SCADA	= PHILADELPHIA LOAD DISPATCHER SCADA CONTROL
HBG PD S	= HARRISBURG POWER DIRECTOR OFFICE SUPERVISORY CONTROL
SAFE HARBOR DC	= SAFE HARBOR POWER COMPANY DIRECT CONTROL
PECO DC	= PECO ENERGY COMPANY DIRECT CONTROL

ALL OTHERS BY TOWERS AS INDICATED BY NAMES AND "S" ON DC

- SWITCH–NORMALLY CLOSED
- SWITCH–NORMALLY OPEN
- HAND OPERATED SWITCH
- LINE AND GROUND SWITCH
- CIRCUIT BREAKER–NORMALLY OPEN
- CIRCUIT BREAKER–NORMALLY CLOSED
- TRANSFORMER
- TRANSFORMER – NEUTRAL GROUND RESISTOR ON 138KV WINDING
- GENERATOR
- UNDERGROUND CABLES
- POTHEAD
- 100HZ SIG MG – 25HZ MOTOR
- 100HZ SIG MG – 60HZ MOTOR
- 9⅛ HZ SIG MG – 25HZ MOTOR
- 9⅛ HZ SIG MG – 60HZ MOTOR
- 100 HZ SOLID STATE SIGNAL CONVERTER –25HZ INPUT
- HAND OPERATED GROUND SWITCH
- BUS TIE

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. AMTRAK DRAWING 390–EE–96 SHALL BE REVISED FOLLOWING THE AS–BUILT PROCESS.
3. EXISTING CIRCUITS 264, 164, 1ED AND 2ED TO BE ABANDONED IN PLACE, EXCEPT AS SHOWN ON CONTRACT DOCUMENTS.
4. BRYN MAWR SUBSTATION 138kV ELECTRIFICATION IS PART OF ANOTHER CONTRACT AND SHALL BE READY FOR CONNECTION WITH THE PROPOSED ZOO TO PAOLI WORK.

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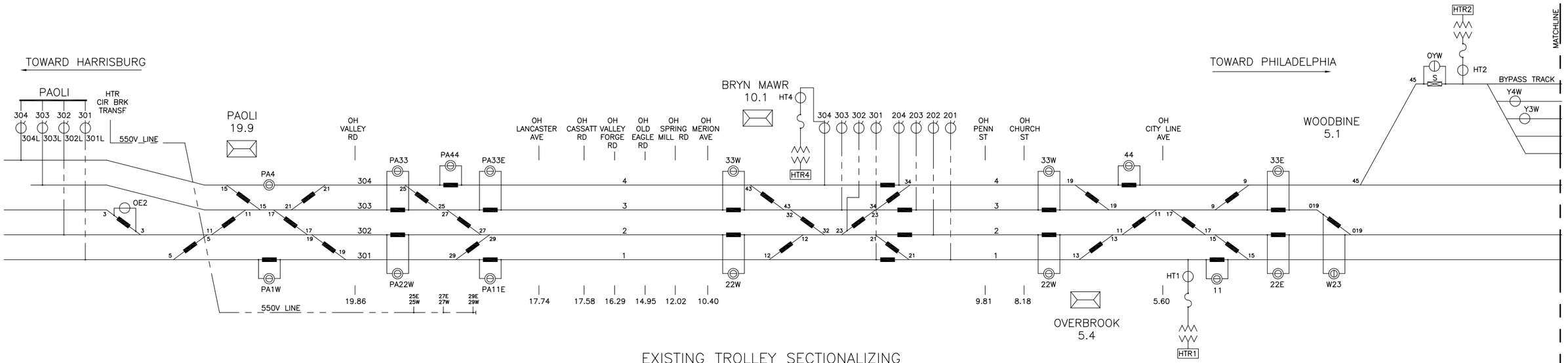
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
OVERALL SYSTEM OPERATING DIAGRAM
138KV SYSTEM – EXISTING & PROPOSED

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

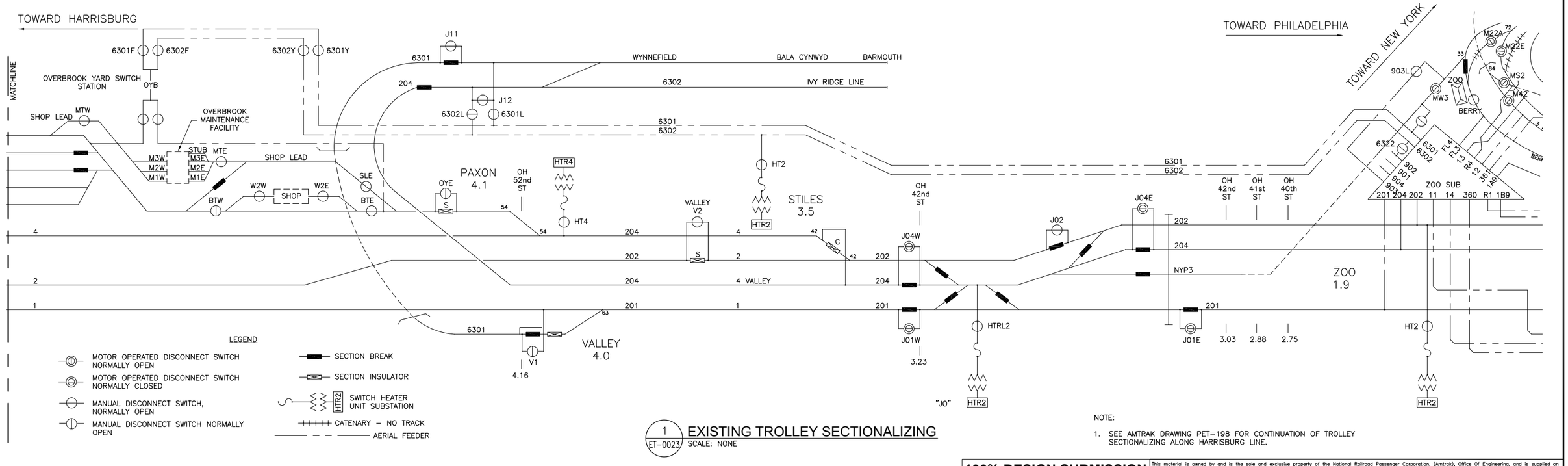
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ET–0021

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EXISTING TROLLEY SECTIONALIZING



1 ET-0023 EXISTING TROLLEY SECTIONALIZING
SCALE: NONE

NOTE:

1. SEE AMTRAK DRAWING PET–198 FOR CONTINUATION OF TROLLEY SECTIONALIZING ALONG HARRISBURG LINE.

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OVERALL SYSTEM OPERATING DIAGRAM
TROLLEY SECTIONALIZING DIAGRAM – ZOO TO PAOLI

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

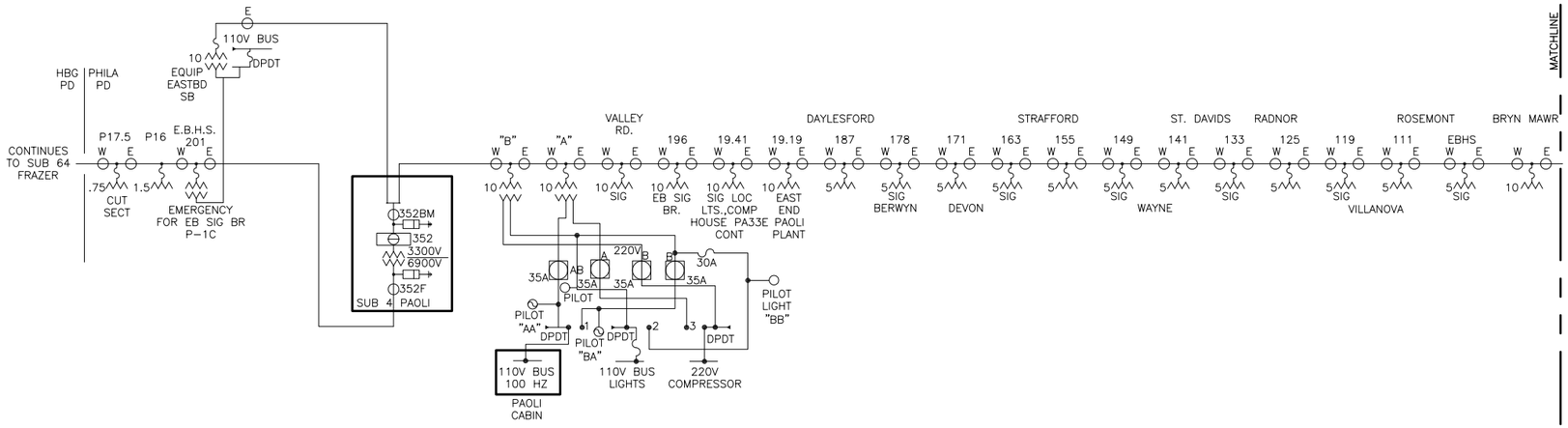
File No.:	2011-059-ET-0023.DWG
Ref. No.:	2011–059
Sheet No:	015 OF 347

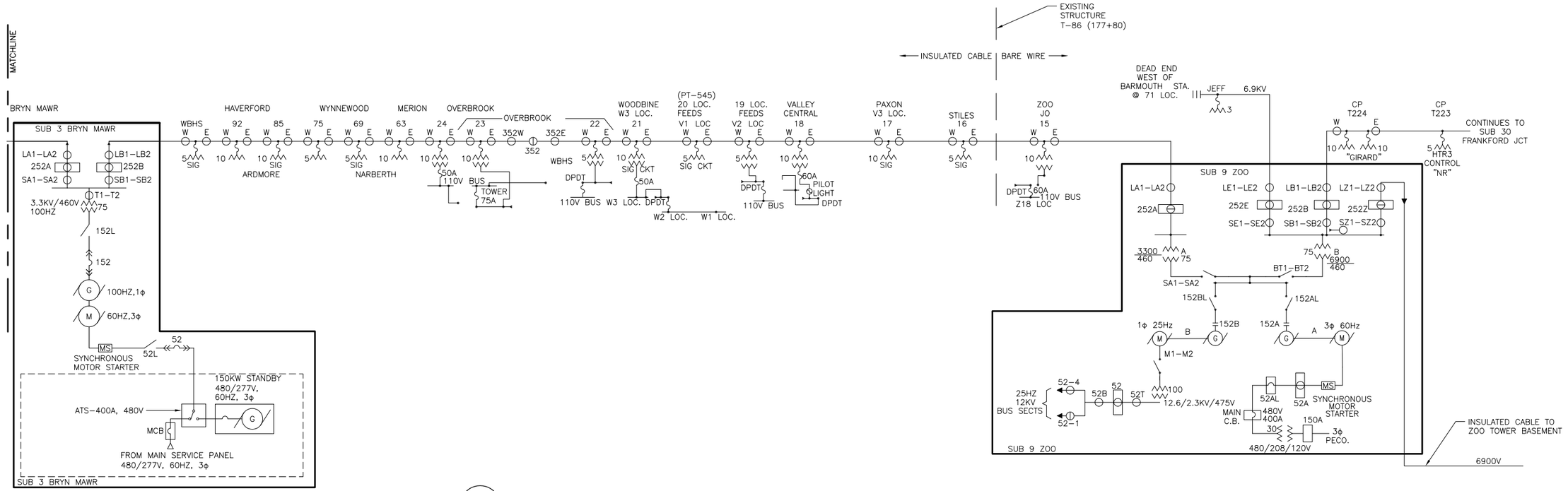
ET–0023

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.





1 ET–0024 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (EXISTING)

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OVERALL SYSTEM OPERATING DIAGRAM 100HZ SIGNAL POWER (EXISTING)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–ET–0024.DWG
Ref. No.:	2011–059
Sheet No:	016 OF 347

ET–0024

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR 352 BREAKER INSTALLATION AT:
   3.1. OVERBROOK SEE SEE DRAWING ET–3201.
4. EXISTING OVERBROOK 352 BREAKER INSTALLATION SHALL BE REPLACED.

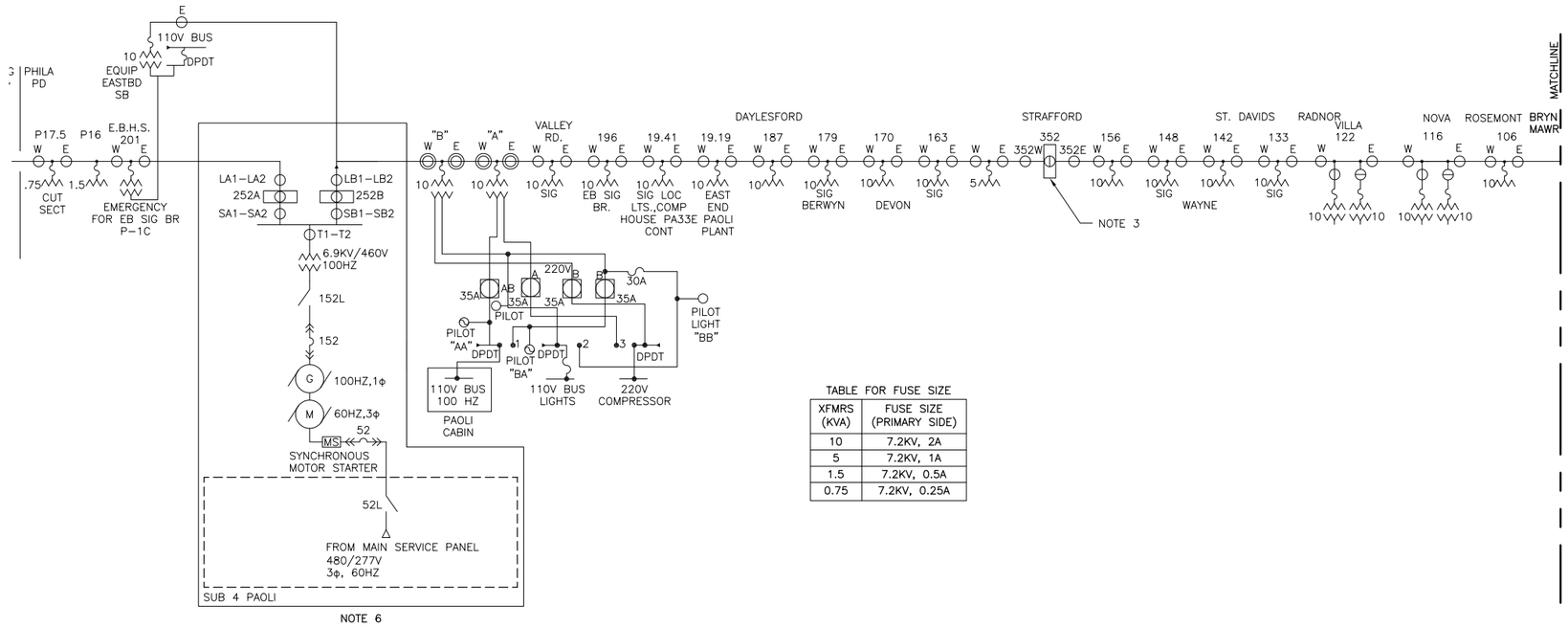
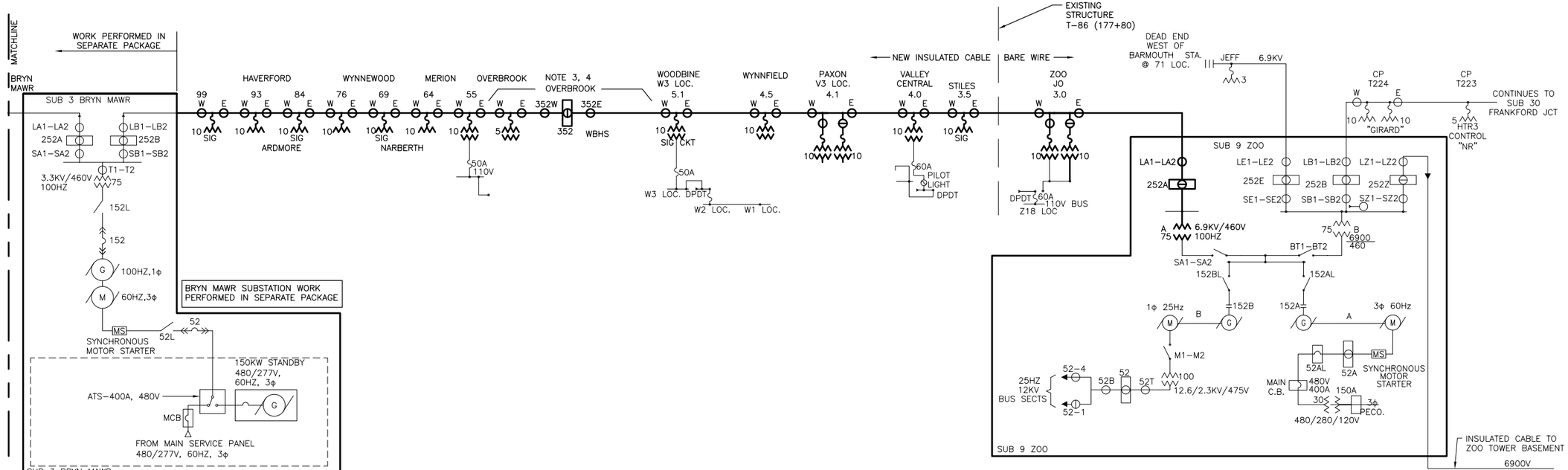


TABLE FOR FUSE SIZE

XFMRS (KVA)	FUSE SIZE (PRIMARY SIDE)
10	7.2KV, 2A
5	7.2KV, 1A
1.5	7.2KV, 0.5A
0.75	7.2KV, 0.25A



1 ET–0025 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (PROPOSED)

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OVERALL SYSTEM OPERATING DIAGRAM 100HZ SIGNAL POWER (PROPOSED)

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS, SEE DRAWING ET–0012.

138kV CLEARANCE CHART

No.	CLEARANCE CHART	AMTRAK		NESC MINIMUM	PROJECT MINIMUM	NOTE
		STANDARD	MINIMUM			
1	LINE SWITCH, POLE TO NEAREST POLE OF ANOTHER LINE SWITCH.	24'–0"	20'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
2	LINE SWITCH, POLE TO POLE OF SAME SWITCH.	24'–0"	20'–0"	–	24'–0"	–
3	LINE TIE SWITCH, POLE TO POLE OF SAME SWITCH.	24'–0"	20'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
4	TRANSFORMER SWITCH, POLE TO POLE OF SAME SWITCH.	18'–0"	18'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
5	CIRCUIT BREAKER ISOLATING SWITCH, POLE TO POLE OF SAME OR ANOTHER SWITCH.	18'–0"	18'–0"	5'–7"	N/A	NESC TABLE 235–1, 144KV
6	CONDUCTORS, SAME POLARITIES OF DIFFERENT CIRCUITS.	16'–0"	15'–0"	5'–7"	24'–0"	NESC TABLE 235–1, 144KV
7	CONDUCTORS, OPPOSITE POLARITIES OF SAME CIRCUIT.	18'–0"	16'–0"	5'–0"	18'–0"	NESC TABLE 235–6, 144KV
8	CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED.	5'–0"	5'–0"	2'–6"	5'–0"	NESC TABLE 235–6
9	CONDUCTOR TO STEEL STRUCTURE, CROSSING.	8'–0"	6'–0"	4'–8"	10'–0"	NESC TABLE 234–1, 144KV
10	CONDUCTOR TO STEEL STRUCTURE, PARALLEL.	10'–0"	8'–0"	4'–8"	N/A	NESC TABLE 234–1, 144KV
11	CONDUCTORS CROSSING, OPPOSITE POLARITIES.	16'–0"	14'–0"	5'–0"	25'–0"	NESC TABLE 235–6, 144KV
12	CONDUCTOR TO FACE OF CLIFF.	30'–0"	20'–0"	–	N/A	–

12kV CLEARANCE CHART

No.	CLEARANCE CHART	AMTRAK		NESC MINIMUM	PROJECT MINIMUM	NOTE
		STANDARD	MINIMUM			
1	TROLLEY CIRCUIT BREAKERS, CENTER TO CENTER.	9'	–	3'–6"	9'–0"	HORIZONTAL CLEARANCE BETWEEN LIVE PARTS, NESC TABLE 124–1
2	SWITCH POLES BETWEEN TROLLEY CIRCUIT BREAKERS AND BUS TO PARALLEL CONDUCTOR OF SAME CIRCUIT.	3'	–	1'–2"	3'–0"	NESC TABLE 235–1, 12KV
3	SWITCH POLES BETWEEN TROLLEY CIRCUIT BREAKERS AND BUS TO PARALLEL CONDUCTOR OF ANOTHER CIRCUIT.	6'	–	1'–2"	6'–0"	NESC TABLE 235–1, 12KV
4	SWITCH POLES, FOR TROLLEY FEEDERS, POLE TO POLE.	9'	6'	2'–2"	6'–0"	NESC TABLE 441–1
5	SWITCH ISOLATING TRANSFORMER CIRCUIT BREAKERS, POLE TO POLE.	5'	–	2'–2"	5'–0"	NESC TABLE 441–1
6	SWITCH ISOLATING BUS TIE BREAKERS, POLE TO POLE.	5'	–	2'–2"	5'–0"	–
7	TROLLEY BUS AND RAIL BUS PARALLEL.	6'	5'	1'–2"	4'–0"	NESC TABLE 235–3 @ 12.47KV
8	CONDUCTOR CROSSING STEEL.	2'	1'–6"	6"	1'–6"	NESC TABLE 235–6, 4.a
9	CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED.	1'–6"	1'–6"	6"	1'–6"*	NESC TABLE 235–6, 4.a
10	FENCE TO NEAREST ENERGIZED PART	–	–	SEE NOTE	PER NESC	10'–4" MEASURED 5' ABOVE GRADE (NESC TABLE 110–1)
11	HORIZONTAL CLEARANCE TO UNGUARDED PART	–	–	3'–7"	3'–7"	NESC TABLE 124–1 @ 23KV
12	VERTICAL CLEARANCE OVER ROADWAY	–	–	18'–6"	35'–0"	NESC TABLE 232–1

* PROJECT MINIMUM *"CONDUCTOR TO STEEL STRUCTURE, WHEN ATTACHED"* DOES NOT INCLUDE THE RAIL RETURN BUS, WHICH IS SUSPENDED BY A SINGLE B1 INSULATOR AND IS LESS THAN 1'–6" FROM STEEL, IN ACCORDANCE WITH NESC TABLE 235–6 NOTE 6.

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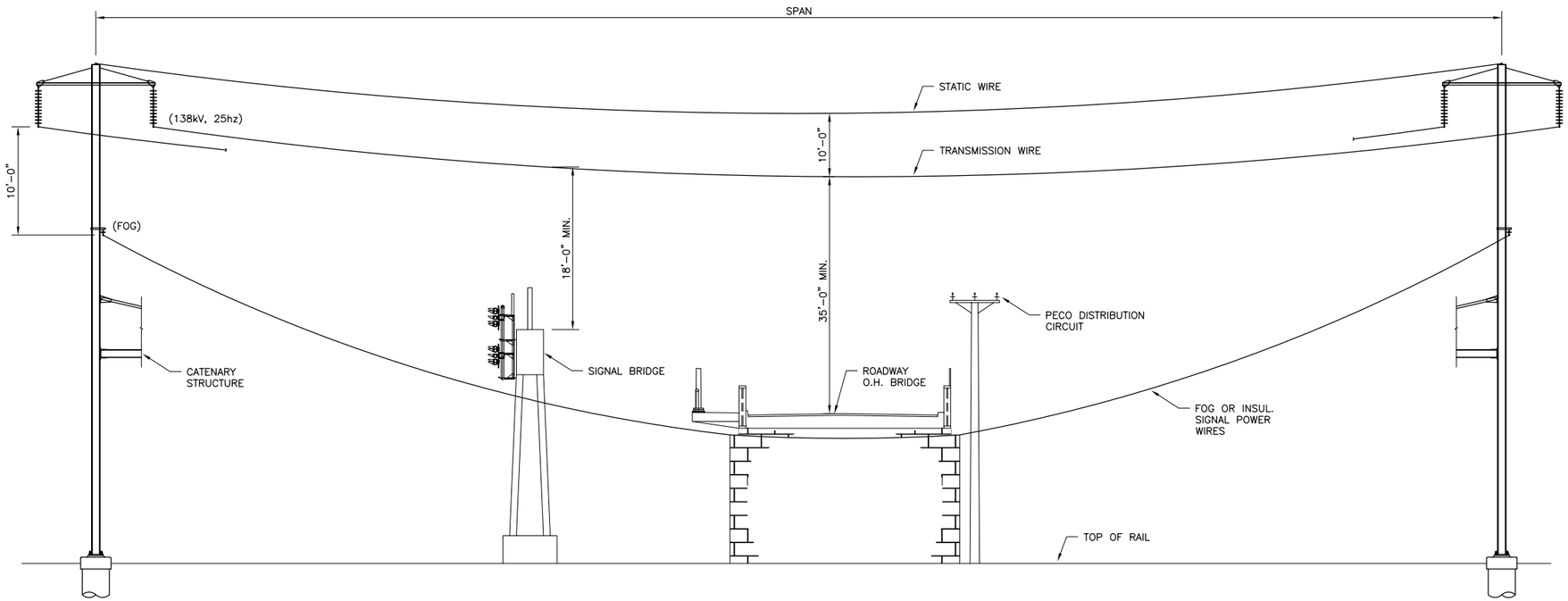
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRACTION POWER
138KV & 12KV SUBSTATION CLEARANCE CHARTS

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File No.:	2011–059–ET–0029.DWG
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ET–0029

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GENERAL NOTES:

1. DRAWING IS NOT TO SCALE AND IS USED TO ILLUSTRATE MINIMUM CLEARANCES.
2. ALL DIMENSIONS ARE IN FEET AND INCHES, UNLESS OTHERWISE NOTED.
3. ALL CLEARANCES SHALL BE THE GREATEST VALUE OF AMTRAK, NESC CODE OR AREMA STANDARDS.
4. 138kV TRANSMISSION LINE CLEARANCE IS BASED ON 145kV INCLUDING 1.05 SURGE FACTOR [(145kV–22kV) * 0.4 IN/kV = 49.2 INCHES = 4.1 FT].
5. 750V TO 22kV CLEARANCE TO GROUND IS 18'–6" OVER ROADWAY AND AMTRAK ACCESS ROADS BASED ON NESC TABLE 232–1, WORST CASE SAG.
6. 750V TO 22kV CLEARANCE TO GROUND IS 14'–0" FOR PEDESTRIAN ACCESS ONLY BASED ON NESC TABLE 232–1, WORST CASE SAG.
7. 750V TO 22kV CLEARANCE TO GROUND FOR ELECTRICAL EQUIPMENT LIKE SIGNAL POWER TRANSFORMERS IS 18'–0" AT ACCESS ROADS AND 14'–0" FOR PEDESTRIAN ACCESS BASED ON NESC TABLE 232–2.
8. 138kV TRANSMISSION LINE CLEARANCE OVER PECO IS 10 FT WORST CASE SAG PER AED–1. NESC RULE 233 CLEARANCE FROM TABLE 233–1 IS 2 FT PLUS 4.1 ADDER.

138kV CLEARANCE TABLE

CONDITIONS	138kV REQ. CLEARANCE	CONTROLLING DOCUMENT
ABOVE GROUND	22'–6"	NESC TABLE 232–1 PLUS ADDER IN RULE 232C1.
ABOVE O.H. BRIDGES, TOP OF ROADWAY	35'–0"	AMTRAK AED–1
ABOVE SIGNAL BRIDGES, TOP OF STEEL	18'–0"	AMTRAK REQUIREMENT
ABOVE OTHER WIRES IN 300 FT SPANS	10'–0"	AMTRAK AED–1

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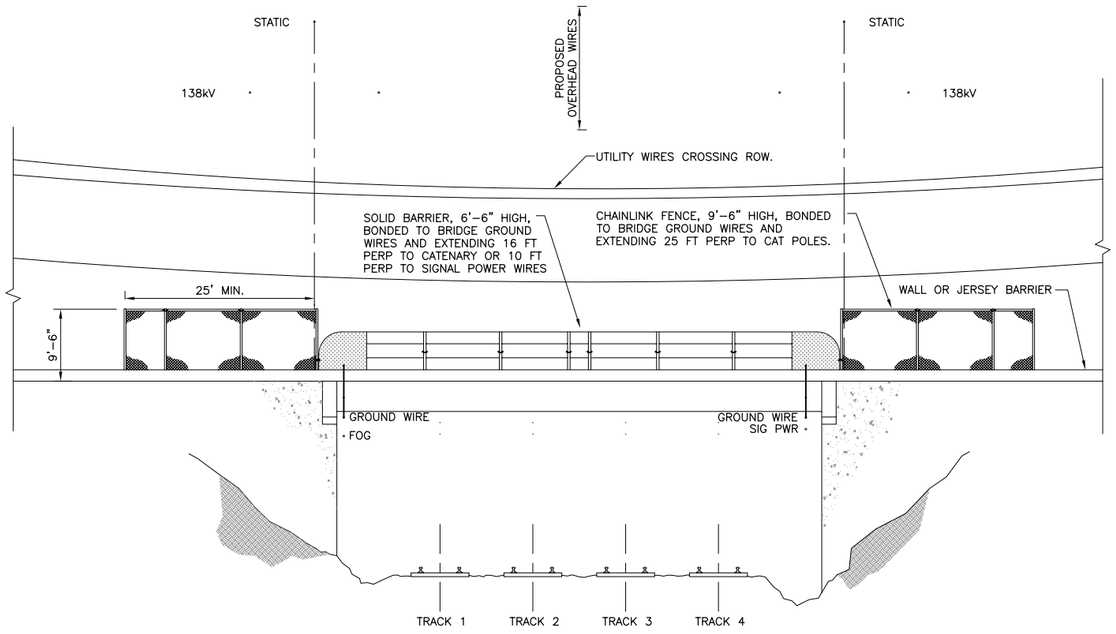
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
OCS
TRANSMISSION LINE CLEARANCES

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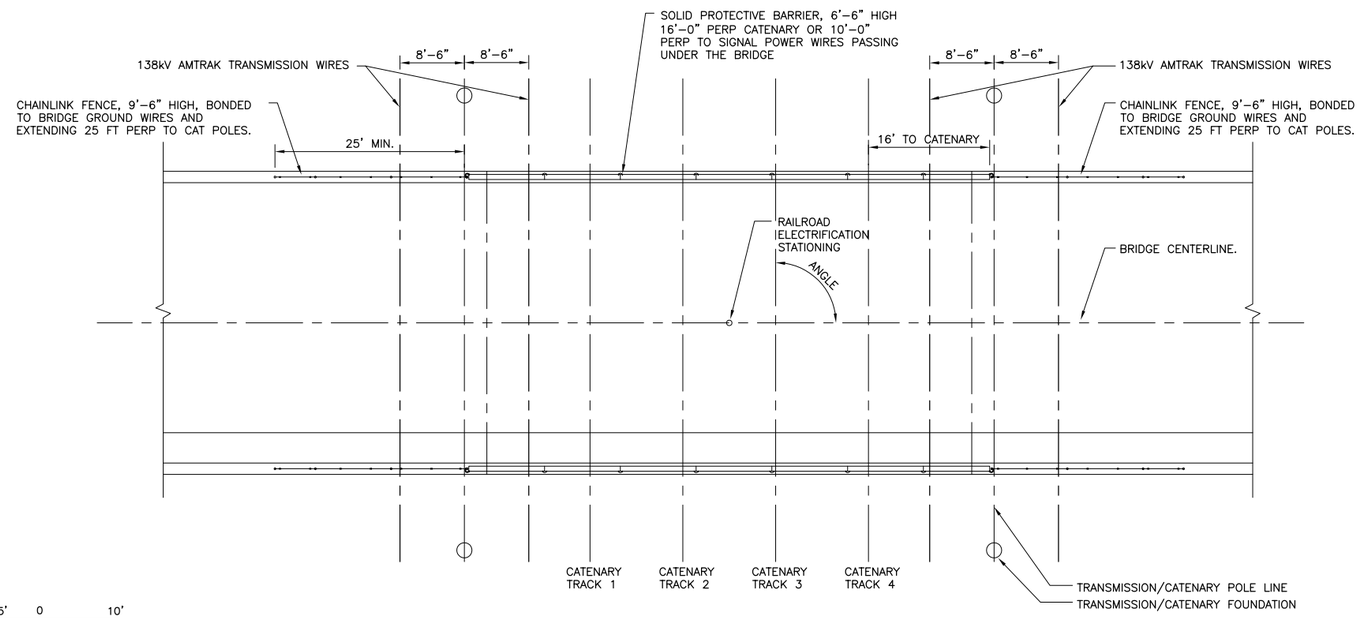
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ELEVATION VIEW



PLAN VIEW

GENERAL NOTES (FROM AMTRAK DRAWING ET-1446-D):

1. ANY MODIFICATIONS TO THE REQUIREMENTS FOR O.H. BRIDGE BARRIERS SHALL BE SUBMITTIED TO THE ELECTRIC TRACTION DEPARTMENT FOR APPROVAL
2. OVERHEAD BRIDGES SHALL BE PROVIDED WITH 6'-6" HIGH SOLID PROTECTIVE BARRIERS ABOVE THE SURFACE OF THE SIDEWALK OR CURB TO PROTECT PEDESTRIANS AGAINST CONTACT WITH RAILROAD WIRES PASSING UNDER THE BRIDGE AND TO PREVENT DAMAGE TO THE WIRES. WHERE A WALKWAY EXISTS ON THE BRIDGE A CURVED FENCE SHALL BE INSTALLED ON TOP OF THE SOLID BARRIER OVER IT'S ENTIRE LENGTH. WHERE NO WALKWAY EXISTS THE FENCE SHALL BE STRAIGHT.
3. NORMALLY THE SIGNAL POWER TRANSMISSION WIRES AND THE TRACTION POWER FEEDER WIRES ARE LOCATED ABOVE THE BRIDGE. FOR THE ALTERNATIVE POSITION OF THESE WIRES UNDER THE BRIDGE, THE PROTECTIVE BARRIER SHALL EXTEND AS SPECIFIED IN NOTE #4.
4. THE PROTECTION BARRIER SHALL EXTEND AT LEAST 16 FEET BEYOND THE POINT AT WHICH ANY CATENARY WIRE PASSES UNDER THE BRIDGE, HOWEVER THE MINIMUM DISTANCE FROM THE END OF THE PROTECTION BARRIER MEASURED TO A POINT OUTSIDE THE BRIDGE AND NORMAL TO THE WIRE SHALL BE 16 FEET. THE PROTECTION BARRIER SHALL EXTEND AT LEAST 10 FEET BEYOND THE POINT AT WHICH A SIGNAL POWER OR TRACTION FEEDER WIRE PASSES UNDER THE BRIDGE, THE MINIMUM DISTANCE FROM THE END OF THE PROTECTION BARRIER MEASURED TO A POINT OUTSIDE THE BRIDGE AND NORMAL TO THE WIRE SHALL BE 10 FEET.
5. WHERE HIGH VOLTAGE WIRES PASS OVER THE BRIDGE, A CHAIN LINK FENCE OR SUITABLE ALTERNATIVE, CAPABLE OF BEING ELECTRICALLY BONDED TO THE BARRIER AND RAIL RETURN SYSTEM, SHALL EXTEND FROM THE END OF THE SOLID BARRIER TO A POINT 25 FEET BEYOND AND NORMAL TO THE CENTERLINE OF THE STRUCTURES SUPPORTING THE WIRES ON EITHER SIDE OF THE BRIDGE.
6. NONMETALLIC BARRIERS SHALL BE PROVIDED WITH GROUND STRIPS, EITHER 3" X ¼" COPPER OR 5" X ½"" ALUMINUM. OTHER MATERIALS MAY BE USED SUBJECT TO THE APPROVAL OF THE ELECTRIC TRACTION DEPARTMENT. METALLIC BARRIERS SHALL BE BONDED AND GROUNDED BY A METHOD AND WITH MATERIALS APPROVED BY THE ELECTRIC TRACTION DEPARTMENT.
7. PROTECTION BARRIERS SHALL BE GROUNDED IN ACCORDANCE WITH AMTRAK DRAWING ET-1120-C, TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES.
8. OVERHEAD BRIDGES WITH OPEN-FLOOR CONSTRUCTION REQUIRE SPECIAL PROTECTION. THE DESIGN OF THE PROPOSED PROTECTION SHALL BE SUBMITTED TO THE ELECTRIC TRACTION DEPTMENT FOR APPROVAL.
9. WHERE LOCAL CONDITIONS WARRANT, THE DIMENSION SHOWN ON THIS DRAWING MAY BE MODIFIED WITH THE APPROVAL OF THE ELECTRIC TRACTION DEPARTMENT.
10. DESIGN DRAWINGS OF THE OVERHEAD BRIDGE SHALL SHOW MINIMUM CLEARANCE, ANGLE AND RAILROAD ELECTRIFICATION STATIONING MEASURED TO THE CENTERLINE OF THE BRIDGE.
11. EXISTING PROTECTION BARRIERS ON BRIDGES OVER ELECTRIFIED TRACKS IN CLASS EIGHT (8) TERRITORY (GREATER THAN 125 MPH) WHERE THERE'S A DEMONSTRATED NEED SHALL BE RETROFITTED WITH THE CURVED OR STRAIGHT FENCE OVER THEIR ENTIRE LENGTH. A 9'-6" HIGH CHAIN LINK FENCE SHALL EXTEND FROM THE END OF THE SOLID PROTECTION BARRIER TO A POINT 16 FEET BEYOND THE CENTERLINE OF THE OUTERMOST ELECTRIFIED TRACK AS SPECIFIED IN NOTE #4 ABOVE. THE FENCE SHALL BE CURVED OR STRAIGHT PER NOTE #2 ABOVE.

BRYN MAWR TO ZOO BARRIER AND FENCING SUMMARY

BRIDGE	STANDARD ALUMINUM BARRIER	TOP FENCE ABOVE ALUMINUM BARRIER	6FT CHAIN LINK FENCE BEYOND BARRIER	PROTECTIVE BARRIER AND FENCE DESRCIPTION	ACTION
PENNSWOOD RD	NO	NO	NO	CORRUGATED BARRIER ATTACHED TO BRIDGE, IRON PICKET FENCES PAST BARRIER.	ADD AN ALUMINUM BAR ACROSS THE TOP OF THE CORRUGATED BARRIERS. INSTALL FENCES ALONG SIDEWALKS, BOND FENCING.
CHURCH RD	YES	YES	YES	ALUMINUM BARRIER ON BOTH SIDES. CURVED FENCE ABOVE BARRIER ALONG SIDEWALK, FENCE EXTENDS PAST BARRIER.	NO MODIFICATIONS REQUIRED.
NARBERTH RD	NO	NO	NO	CORRUGATED BARRIER ATTACHED TO BRIDGE, 3FT FENCE ATTACHED TO RAILINGS.	ADD AN ALUMINUM BAR ACROSS THE TOP OF THE CORRUGATED BARRIERS. INSTALL FENCES ALONG SIDEWALKS, BOND FENCING.
N. BOWMAN AVE	YES	NO	YES	ALUMINUM BARRIER ON BOTH SIDES. FENCE EXTENDS PAST BARRIER.	NO MODIFICATIONS REQUIRED.
CITY AVE	NO	NO	NO	6FT CONCRETE BARRIER ON BOTH SIDES.	ADD AN ALUMINUM BAR ALONG THE BARRIER AND BOND TO RAIL RETURN SYSTEM.
59TH ST	NO	NO	NO	BRIDGE GIRDERS WITH IRON PICKET FENCE AT VARIOUS SPOTS ALONG THE BRIDGE.	VERIFY EXISTING BRIDGE IS BONDED TO RAIL RETURN.
52ND ST	NO	NO	NO	RAILROAD BRIDGE, NO BARRIERS AND NO ACCESS.	VERIFY EXISTING BRIDGE IS BONDED TO RAIL RETURN.

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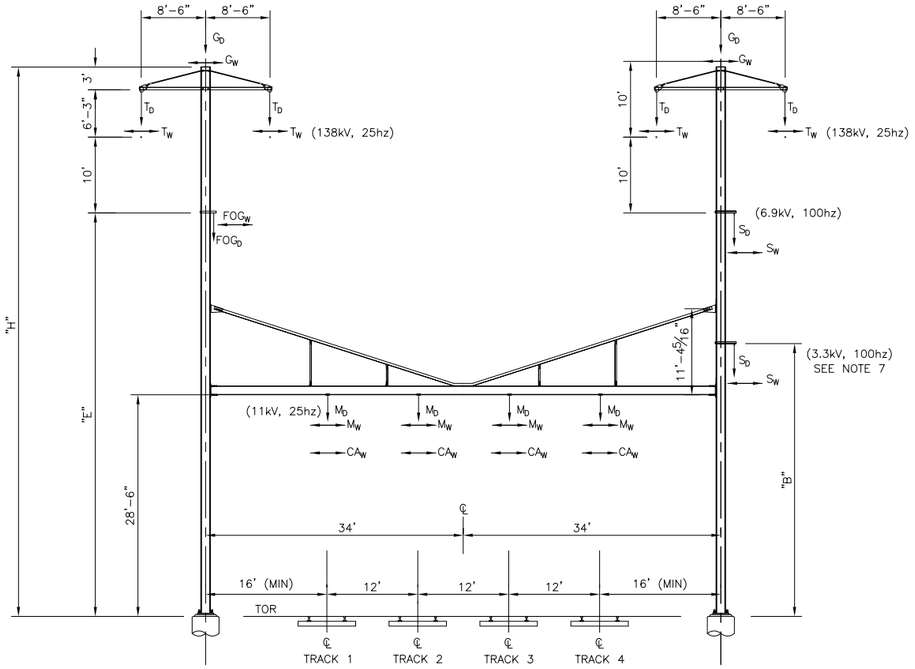
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BRIDGE BARRIERS
TYPICAL O.H. BRIDGE BARRIERS

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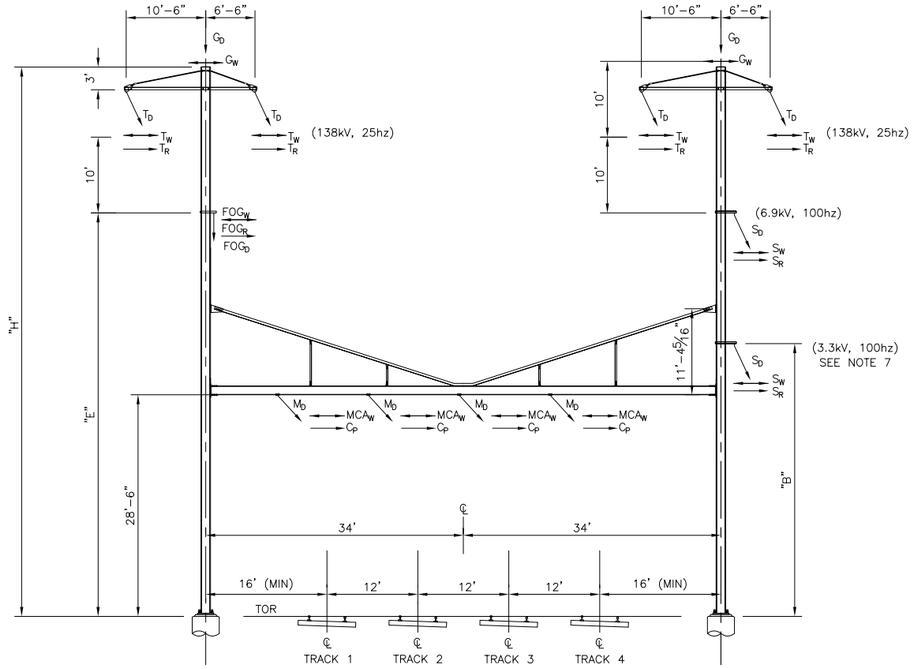
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TANGENT TRACK
(LOOKING WEST)



CURVED TRACK
(LOOKING WEST)

STRUCTURE LOAD TABLE

LOAD	½" ICE, 40 MPH WIND (LBS/FT)	BARE, 90 MPH WIND (LBS/FT)
G_D	1.35	0.700
G_W	0.537	0.991
T_D	1.50	0.656
T_W	0.634	1.483
FOG_D	1.26	0.486
FOG_W	0.589	1.253
F_D	1.985	1.235
F_W	0.59	1.258
S_D	3.552	1.738
S_W	1.223	4.465
M_D	4.217	2.27
M_W	0.555	1.08
MCA_W	1.567	2.746
CA_W	1.012	1.666

STRUCTURE RADIAL LOAD TABLE

LOAD	TENSION @ −10° WITH ½" ICE AND WIND	CALCULATED RADIAL LOAD FOR ø=½°
G_R	3587	65
T_R	4144	75
FOG_R	4508	80
F_R	5459	100
S_R	6437	115
M_R	7594	135

*CALCULATED LOAD ROUNDED UP TO NEXT "5".

STRUCTURE HEIGHT TABLE

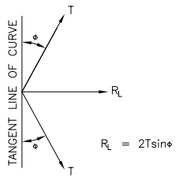
HEIGHT (FT)	OPEN ROUTE	OH BRIDGE
H	60'−0"	82'−0"
B	36'−0"	36'−0"
E	40'−0"	20'−0"

SEE NOTE 9

STRUCTURE LOAD KEY

SYM	DESCRIPTION	WIRE TYPE AND SIZE
G_D	STATIC WIRE DEAD LOAD	9/16" COPPERWELD
G_W	STATIC WIRE WIND LOAD	
G_R	STATIC WIRE RADIAL LOAD	
T_D	138kV WIRE DEAD LOAD	477 kcmil ACSR HAWK
T_W	138kV WIRE WIND LOAD	
T_R	138kV WIRE RADIAL LOAD	
FOG_D	AERIAL FIBER WIRE DEAD LOAD	ALCOA S1−129/44/725
FOG_W	AERIAL FIBER WIRE WIND LOAD	
FOG_R	AERIAL FIBER WIRE RADIAL LOAD	
F_D	FEEDER WIRE DEAD LOAD	400 kcmil BARE COPPER
F_W	FEEDER WIRE WIND LOAD	
F_R	FEEDER WIRE RADIAL LOAD	
S_D	SIGNAL POWER WIRE DEAD LOAD	2C−#2 CONDUCTOR BUNDLE WITH 3/8" EHS STEEL MESSENGER WIRE
S_W	SIGNAL POWER WIRE WIND LOAD	
S_R	SIGNAL POWER WIRE RADIAL LOAD	
M_D	MESSENGER WIRE DEAD LOAD	5/8" BRONZE WIRE
M_W	MESSENGER WIRE WIND LOAD	
M_R	MESSENGER WIRE RADIAL LOAD	
MCA_W	MESSENGER, AUX AND CONTACT WIND LOAD	5/8" MW AND TWIN 4/0 GROOVED TROLLEYS
CA_W	CONTACT AND AUXILLARY WIRE WIND LOAD	TWIN 4/0 GROOVED TROLLEYS
C_P	CATENARY CURVE PULL (RADIAL LOAD)	5/8" MW AND TWIN 4/0 GROOVED TROLLEYS

NOTES:
1. WIRE LOADS SUPPORTED BY INSULATOR STRINGS ARE APPLIED TO THE SUPPORTING BRACKETS AT THE BRACKET HEIGHT.
2. SEE WIRE PARTICULAR DRAWINGS ON ET−0092, ET−0093 AND ET−0094 FOR ADDITIONAL WIRE DATA.
3. CURVE PULL IS CALCULATED AS TENSION/CURVE RADIUS IN FT.
4. RADIAL LOADS ARE CALCULATED AS 2 x TENSION x SIN (WIRE ANGLE).
5. WIRE ANGLE IS MEASURED OFF TANGENT LINE OF CURVE.
6. WIRE TENSIONS ARE BASED ON THE AMBIENT TEMPERATURES FOR THE SPECIFIC LOAD CASES.
7. EXISTING 3.3kV SIGNAL POWER WIRES WILL BE REMOVED AFTER 6.9kV SIGNAL POWER WIRES ARE COMMISSIONED.
8. LONGITUDINAL STORM GUYS WILL BE INSTALLED AT INTERMEDIATE STRUCTURES AND SHOULD BE INCLUDED IN BUCKLING ANALYSIS.
9. STRUCTURE HEIGHTS ARE CONSIDERED PRELIMINARY AND WILL BE SUPERCEDED BY INDIVIDUAL STRUCTURAL ERECTION DIAGRAMS.



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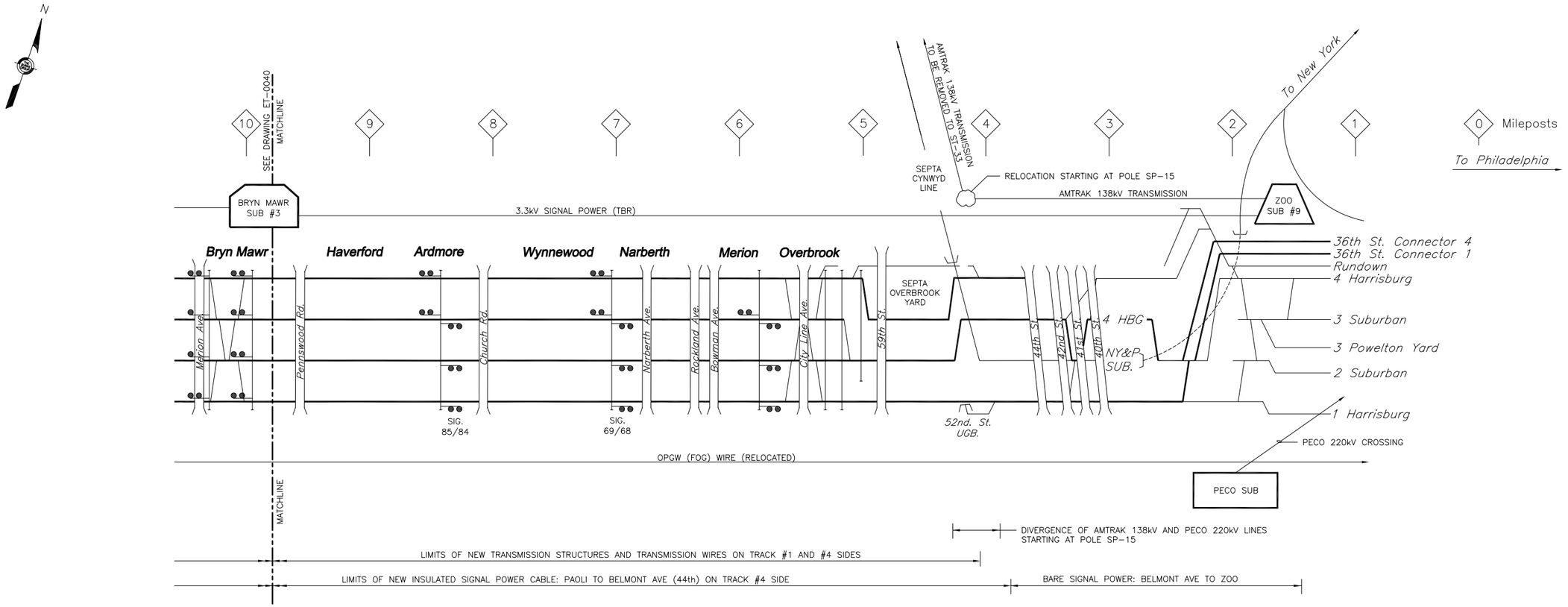
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
LOAD STRUCTURE DIAGRAM
LOAD TABLE & LOAD KEY

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TRANSMISSION STAGING PLANS: BRYN MAWR TO ZOO

NOT TO SCALE

SUGGESTED CONSTRUCTION SEQUENCE:

1. INSTALL FOUNDATIONS ALONG TRACKS #1 AND #4.
2. INSTALL POLES AND K-FRAMES ACROSS THE RAILROAD.
3. INSTALL MONOPOLE FOUNDATIONS SOUTH OF 52nd STREET BRIDGE FOR NEW AMTRAK TRANSMISSION STRUCTURES.
4. INSTALL MONOPOLES SOUTH OF 52nd STREET BRIDGE.
5. TRANSFER OPGW (FOG) WIRES TO NEW STRUCTURES AND LOWER BELOW TRANSMISSION ENVELOPE.
6. INSTALL TRANSMISSION AND STATIC WIRES ON TRACKS #1 AND #4 POLES. PULL WIRES, TENSION AND CLIP IN.
7. SEPARATE AMTRAK TRANSMISSION WIRES AT SP-15 AND ROUTE SOUTH OF 52nd STREET BRIDGE TO NEW ALIGNMENT ALONG KEYSTONE CORRIDOR.
8. TERMINATE EXISTING AMTRAK 138kV CONDUCTORS NORTH OF 52nd STREET BRIDGE.

SUGGESTED CONSTRUCTION SEQUENCE (CONTINUED):

9. INSTALL SIGNAL POWER CABLE (INSULATED 6.9Kv) ALONG TRACK #4 POLES.
10. INSTALL BARE SIGNAL POWER WIRES BETWEEN BELMONT AND ZOO SUBSTATION.
11. CUT OVER SIGNAL POWER TO 6.9kV SERVICE.
    NOTE: SIGNAL POWER GENERATION WORK MUST BE COMPLETE AT BRYN MAWR AND ZOO PRIOR TO THIS STEP.
12. TRANSFER CATENARY AND DEMOLISH EXISTING STRUCTURES INCLUDING EXISTING 3.3kV SIGNAL POWER.
13. REMOVE TRANSMISSION LINES FROM ST-15 NEAR 52ND STREET TO ST-33.

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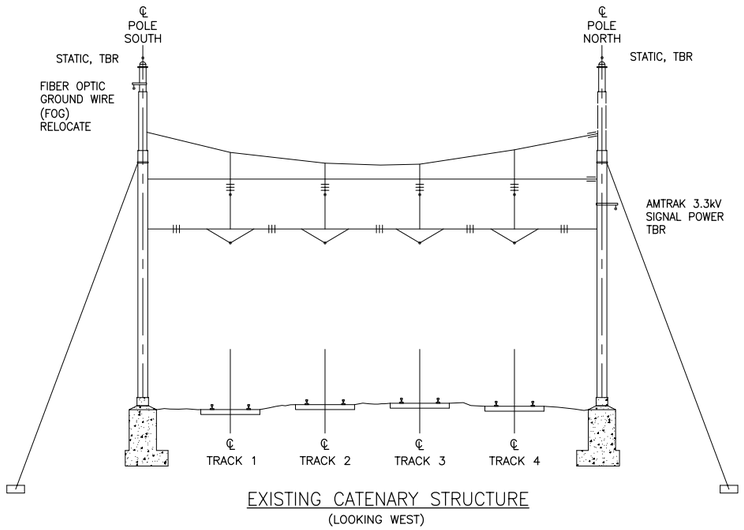
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STAGING PLANS - TRANSMISSION
STAGING PLANS (SHEET 2 OF 4)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

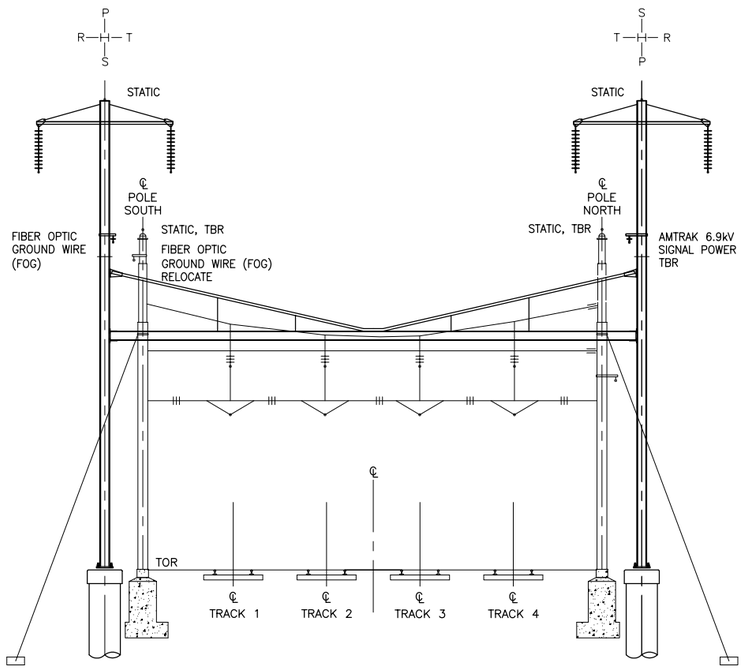
File No.:	2011-059-ET-0041.DWG
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ET-0041

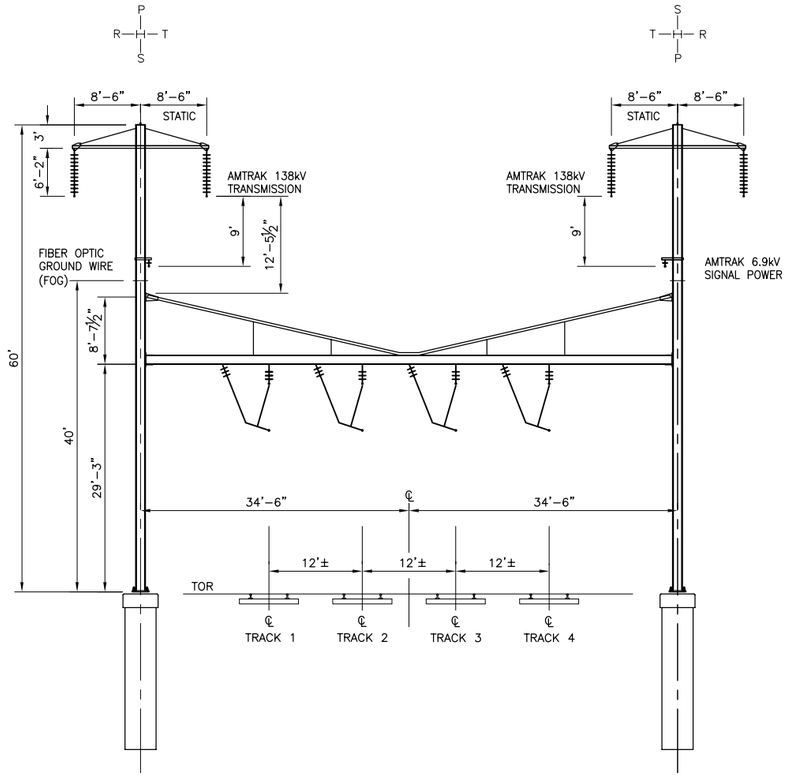
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EXISTING CATENARY STRUCTURE
(LOOKING WEST)



STAGE 1
(LOOKING WEST)



STAGE 2
(LOOKING WEST)

BRYN MAWR TO ZOO

STAGE 1

1. INSTALL FOUNDATIONS, POLES AND K–FRAMES ON BOTH NORTH AND SOUTH SIDE
2. TRANSFER FIBER OPTIC GROUND CONDUCTOR TO NEW SOUTH POLE
3. INSTALL NEW TRANSMISSION AND STATIC WIRE ON NEW NORTH AND SOUTH POLES
4. INSTALL 6.9 kV SIGNAL POWER ON NEW NORTH POLE

STAGE 2

1. TRANSFER AND RE–PROFILE CATENARY
2. DEMOLISH EXISTING 3.3kV SIGNAL POWER LINE
3. DEMOLISH EXISTING CATENARY STRUCTURES, GUYS AND FOUNDATIONS

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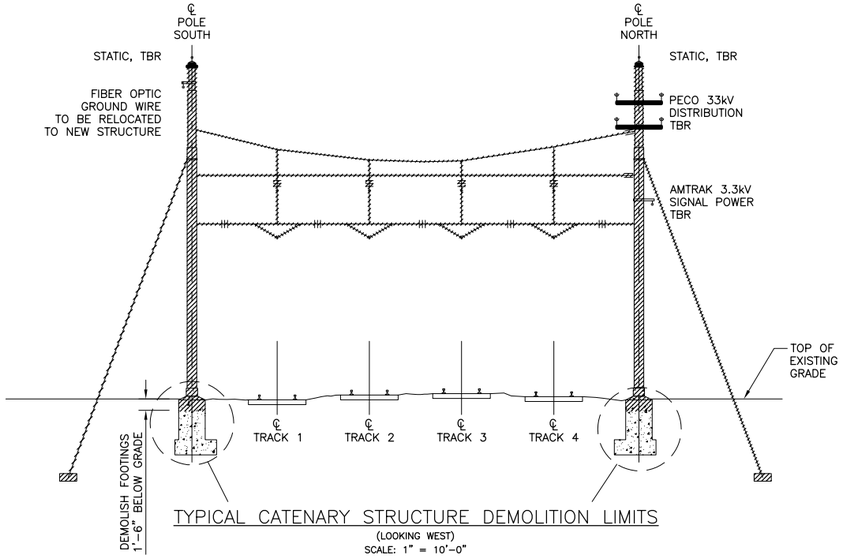
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STAGING PLANS – TRANSMISSION
STAGING PLANS (SHEET 4 OF 4)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

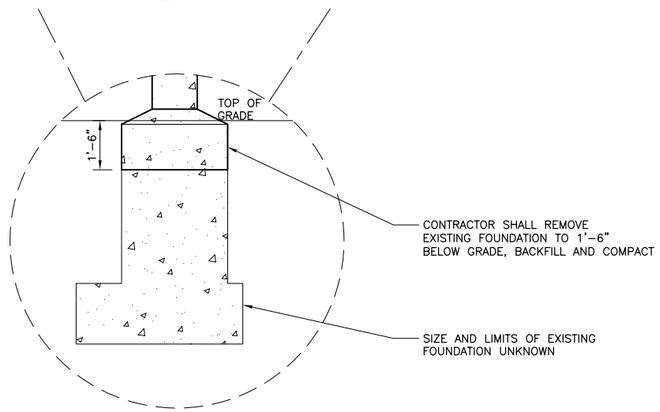
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ET–0043

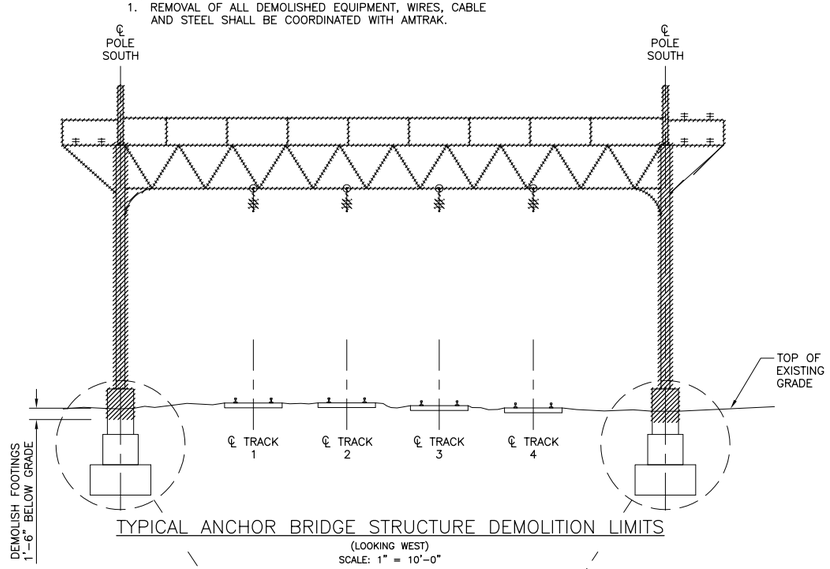


TYPICAL CATENARY STRUCTURE DEMOLITION LIMITS

(LOOKING WEST)
SCALE: 1" = 10'-0"

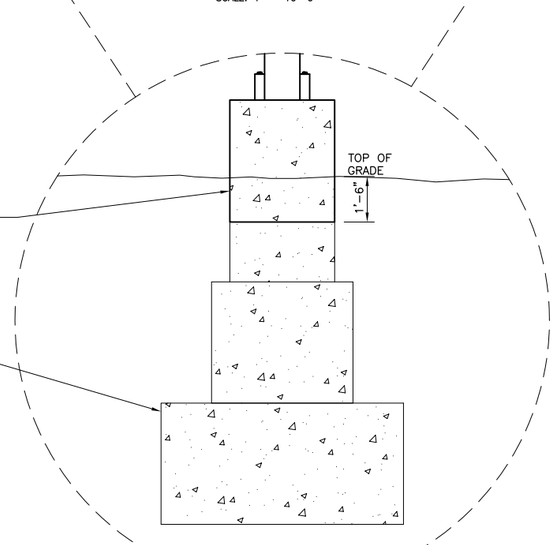


NOTES
1. REMOVAL OF ALL DEMOLISHED EQUIPMENT, WIRES, CABLE AND STEEL SHALL BE COORDINATED WITH AMTRAK.



TYPICAL ANCHOR BRIDGE STRUCTURE DEMOLITION LIMITS

(LOOKING WEST)
SCALE: 1" = 10'-0"



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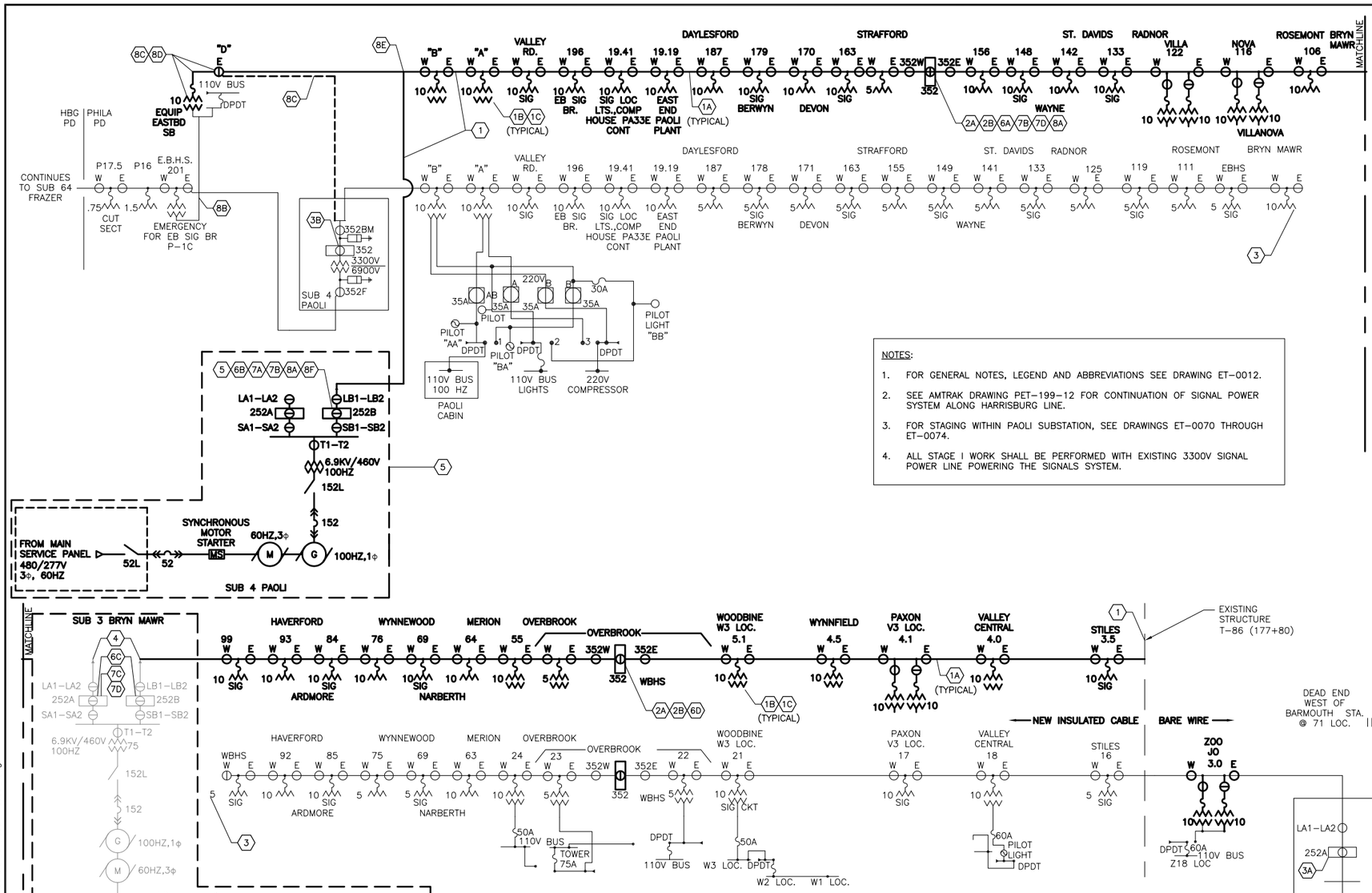
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
EXISTING CATENARY STRUCTURES
TYPICAL LIMITS OF DEMOLITION

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-0044.DWG
Ref. No.:	2011-059
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. SEE AMTRAK DRAWING PET–199–12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET–0070 THROUGH ET–0074.
4. ALL STAGE I WORK SHALL BE PERFORMED WITH EXISTING 3300V SIGNAL POWER LINE POWERING THE SIGNALS SYSTEM.

STAGE I:

1. BETWEEN EXISTING STRUCTURE T–86 (STA. 177+80) AND PAOLI SUBSTATION:
   1.A. INSTALL NEW 6900V SIGNAL POWER CABLES.
   1.B. INSTALL NEW 6900/120V TRANSFORMERS AT EACH SIGNAL HUT.
   1.C. INSTALL TAPS TO NEW 6900V SIGNAL POWER TRANSFORMERS.
2. AT OVERBROOK AND STRAFFORD:
   2.A. INSTALL NEW SIGNAL POWER 352 CIRCUIT BREAKER.
   2.B. MODIFY NEW SIGNAL POWER CABLES TO CONNECT THE NEW 352 BREAKER.
3. EXISTING BRYN MAWR SUBSTATION SHALL BE TAKEN OUT OF SERVICE. (OTHER CONTRACT)
   3.A. EXISTING 252A (3300V) AT ZOO SUB SHALL FEED THE SIGNAL POWER LINE FROM ZOO TO BRYN MAWR.
   3.B. EXISTING 352 (3300V) AT PAOLI SUB SHALL FEED THE SIGNAL POWER LINE FROM PAOLI TO BRYN MAWR.
4. TEST AND COMMISSION NEW SIGNAL POWER EQUIPMENT AT BRYN MAWR SUBSTATION AND TERMINATE NEW 6900V SIGNAL POWER CONDUCTORS TO 252 BREAKERS. (BRYN MAWR PROJECT).
5. INSTALL, TEST AND COMMISSION NEW SIGNAL POWER EQUIPMENT AT PAOLI SUBSTATION AND TERMINATE NEW 6900V SIGNAL POWER CONDUCTORS TO 252B BREAKER.

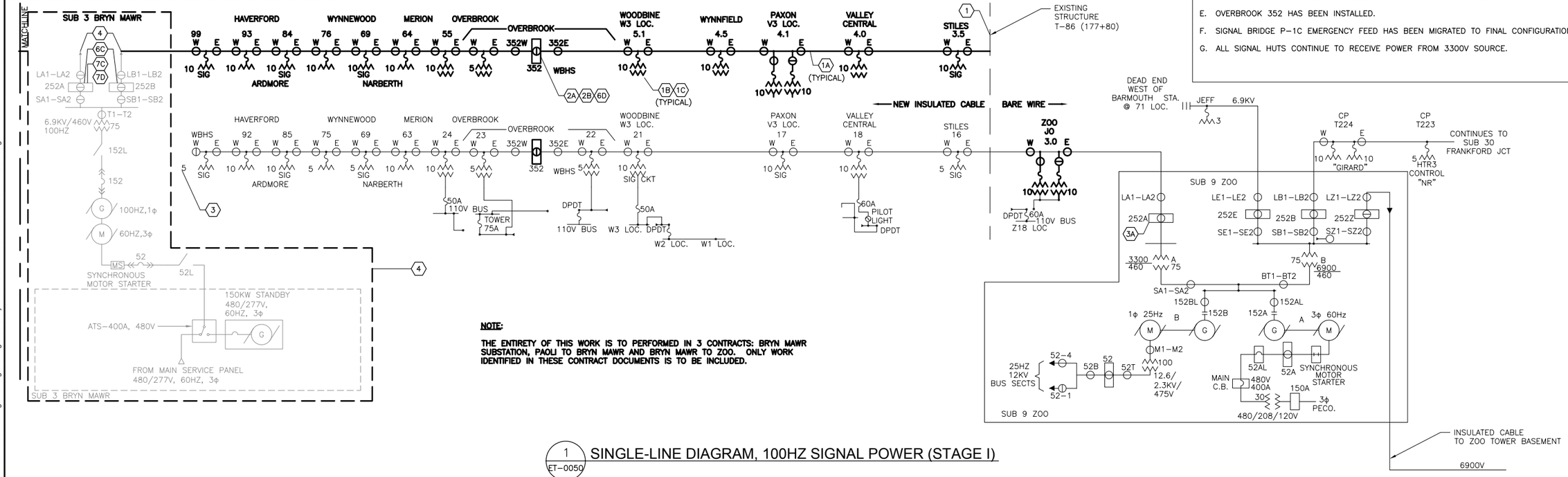
   NOTE: AT PAOLI SUBSTATION BOTH NEW 252 BREAKERS ARE OPEN AND EXISTING 352 REMAINS IN SERVICE, ALLOWING FRAZER SUBSTATION TO FEED SIGNAL HUTS EAST TO BRYN MAWR SUBSTATION.

6. ENERGIZE THE ENTIRE LENGTH OF THE NEW 6900V SIGNAL POWER CONDUCTORS
   6.A. OPEN STRAFFORD CIRCUIT BREAKER 352.
   6.B. CLOSE PAOLI SUBSTATION CIRCUIT BREAKER 252B.
   6.C. CLOSE BRYN MAWR SUBSTATION CIRCUIT BREAKERS 252A AND 252B.
   6.D. CLOSE OVERBROOK CIRCUIT BREAKER 352.
7. TEST STRAFFORD 352 BREAKER
   7.A. OPEN PAOLI 252B AND VERIFY THAT STRAFFORD 352 CLOSES AUTOMATICALLY.
   7.B. OPEN STRAFFORD 352 AND CLOSE PAOLI 252B TO RESTORE NORMAL OPERATING CONDITIONS.
   7.C. OPEN BRYN MAWR 252A AND VERIFY THAT STRAFFORD 352 CLOSES AUTOMATICALLY.
   7.D. OPEN STRAFFORD 352 AND CLOSE BRYN MARW 252A TO RESTORE NORMAL OPERATING CONDITIONS.
8. MIGRATE SIGNAL BRIDGE P–1C EMERGENCY XFRM FEED TO FINAL CONFIGURATION
   8.A. OPEN PAOLI 252B AND STRAFFORD 352.
   8.B. FEED 110V BUS FROM EMERGENCY TRANSFORMER AT SIGNAL BRIDGE P–1C (1072+50).
   8.C. REMOVE 3300V TRANSFORMER, WIRING AND ASSOCIATED EQUIPMENT.
   8.D. INSTALL NEW 6900/120V TRANSFORMER AND NEW ASSOCIATED EQUIPMENT.
   8.E. TAP TO NEW (DE–ENERGIZED) 6900V SIGNAL POWER CONDUCTORS.
   8.F. CLOSE PAOLI 252B.
   8.G. TEST AND RESTORE SIGNAL BRIDGE TO NORMAL OPERATING CONFIGURATION.

STAGE I SUMMARY:

AT THE END OF STAGE I:

A. NEW 6900V SIGNAL POWER CONDUCTORS, TRANSFORMERS AND ASSOCIATED EQUIPMENT HAVE BEEN ENERGIZED FOR TESTING PURPOSES.
B. SIGNAL POWER AT BRYN MAWR SUBSTATION HAS BEEN TESTED AND COMMISSIONED.
C. NEW SIGNAL POWER EQUIPMENT AT PAOLI SUBSTATION HAS BEEN INSTALLED, TESTED AND COMMISSIONED.
D. STRAFFORD 352 HAS BEEN INSTALLED, TESTED AND COMMISSIONED.
E. OVERBROOK 352 HAS BEEN INSTALLED.
F. SIGNAL BRIDGE P–1C EMERGENCY FEED HAS BEEN MIGRATED TO FINAL CONFIGURATION.
G. ALL SIGNAL HUTS CONTINUE TO RECEIVE POWER FROM 3300V SOURCE.



NOTE:

THE ENTIRETY OF THIS WORK IS TO PERFORMED IN 3 CONTRACTS: BRYN MAWR SUBSTATION, PAOLI TO BRYN MAWR AND BRYN MAWR TO ZOO. ONLY WORK IDENTIFIED IN THESE CONTRACT DOCUMENTS IS TO BE INCLUDED.

1 ET–0050 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE I)

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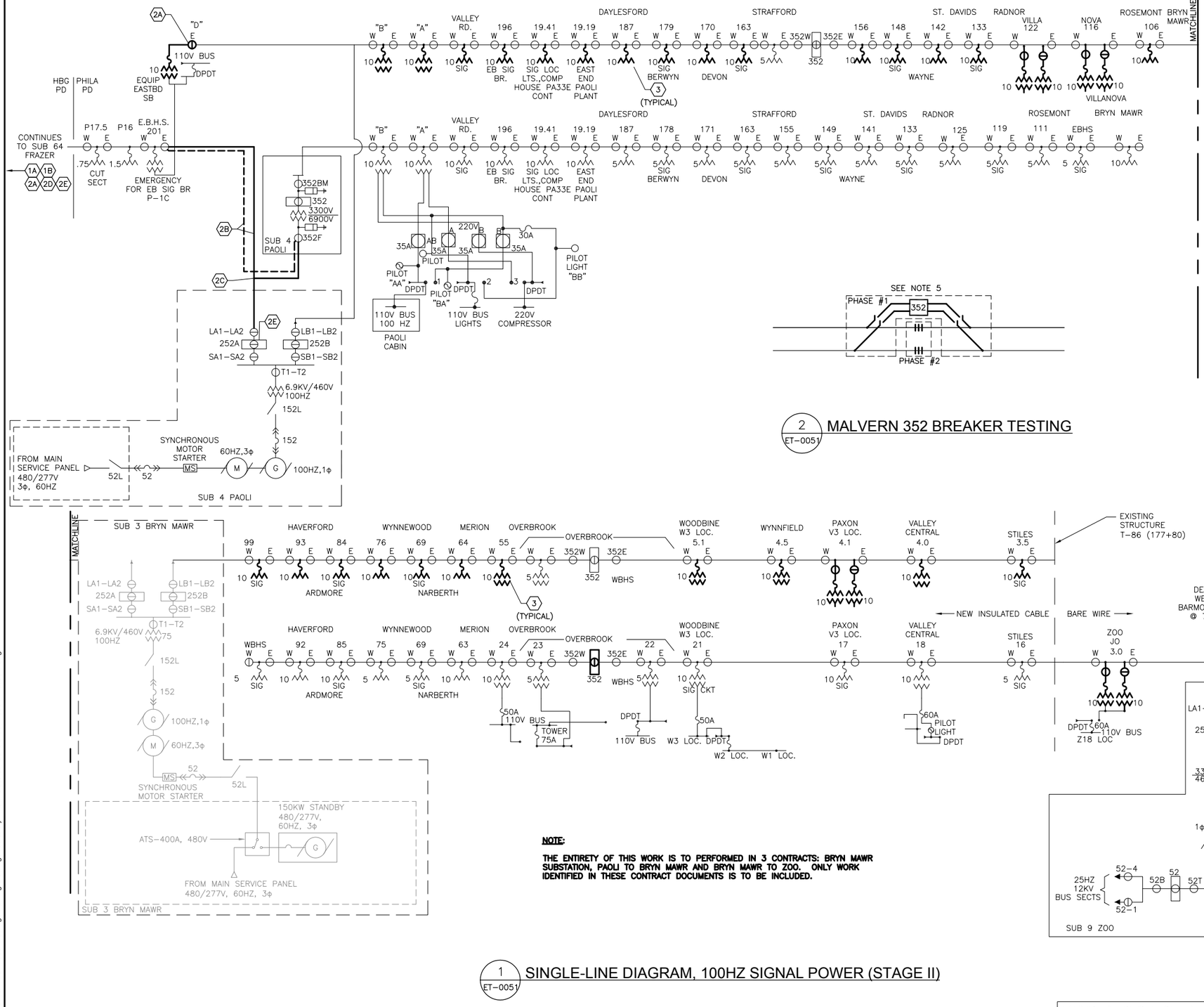
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STAGING PLANS – SIGNAL POWER
100HZ SIGNAL POWER (SHEET 1 OF 3)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

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1 ET-0051 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE II)

STAGE II:

1. BETWEEN FRAZER AND PAOLI SUBSTATION, NEAR MALVERN STATION.
 1.A. INSTALL NEW SIGNAL POWER 352 CIRCUIT BREAKER IN PARALLEL WITH EXISTING 6900V LINE.
 1.B. TEST MALVERN 352 BREAKER – PRIOR TO MAKING THE CUT-INS (SEE DETAIL 2/ET-0051).

2. ISOLATE EXISTING 6900V SIGNAL POWER BETWEEN FRAZER AND PAOLI STATION.
 2.A. OPEN FRAZER 252B AND TEMPORARILY LIFT P-1C WIRES.

NOTE: THIS WILL DE-ENERGIZE EXISTING SIGNAL POWER LINE BETWEEN FRAZER SUBSTATION AND PAOLI STATION. COORDINATION WITH SIGNALS DEPARTMENT IS REQUIRED.

 2.A. REMOVE WESTBOUND SIGNAL POWER CONDUCTORS FROM EXISTING PAOLI 352 AND RE-CIRCUIT TO NEW PAOLI 252A.
 2.B. INSTALL TEMPORARY TAP FROM NEW PAOLI 252A TO EXISTING PAOLI 352 TRANSFORMER.
 2.C. MODIFY MAIN LINE SIGNAL POWER CONDUCTOR TO CONNECT THE NEW MALVERN 352 BREAKER.
 2.D. OPEN MALVER 352, CLOSE FRAZER 252B AND CLOSE PAOLI 252A.

NOTE: THIS WILL RESTORE SIGNAL POWER BETWEEN FRAZER AND PAOLI STATION.

3. CUTOVER EACH SIGNAL HUT FROM 3300V SOURCE TO 6900V SOURCE:
 3.A. WITH AMTRAK'S PERMISSION, DE-ENERGIZE A SIGNAL HUT AND REMOVE THE CUTOUTS UPSTREAM OF THE 3300V HUT TRANSFORMER.
 3.B. CIRCUIT THE SECONDARY OF THE NEW 6900V TRANSFORMER TO THE HUT MAIN CIRCUIT BREAKER.
 3.C. RESTORE POWER TO THE SIGNAL HUT BY REPLACING ONLY THE CUTOUT TO THE NEW 6900V TRANSFORMER.

NOTE: THE SIGNAL HUT IS NOW FED FROM THE 6900V SOURCE, BUT CAN EASILY BE RESTORED TO THE 3300V SOURCE. REPEAT FOR EACH SIGNAL HUT, AS NIGHTLY OUTAGES ALLOW.

STAGE II SUMMARY:

AT THE END OF STAGE II:

A. THE MALVERN 352 BREAKER HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

B. THE 6900V SIGNAL POWER LINE BETWEEN FRAZER SUBSTATION AND PAOLI SUBSTATION IS IN FINAL CONFIGURATION.

C. TEMPORARY TAP HAS BEEN INSTALLED WITHIN PAOLI SUBSTATION FEEDS EASTBOUND 3300V SIGNAL POWER VIA BRYN MAWR STATION TO ZOO SUBSTATION.

D. EACH SIGNAL HUT BETWEEN PAOLI SUBSTATION AND STILES INTERLOCKING HAS BEEN MIGRATED TO THE NEW 6900V SIGNAL POWER SOURCE, WITH A BACKUP CONNECTION TO THE EXISTING 3300V AVAILABLE IF NEEDED.

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. SEE AMTRAK DRAWING PET-199-12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET-0070 THROUGH ET-0074.
4. ALL STAGE II WORK SHALL BE PERFORMED WITH EXISTING 3300V SIGNAL POWER LINE AVAILABLE TO POWER THE SIGNALS SYSTEM.
5. TO AVOID LONG TIME SIGNAL POWER OUTAGE, DURING PHASE #1 CONNECT MALVERN 352 BREAKER IN PARALLEL FOR TESTING. ONCE TESTING IS COMPLETE INSTALL DEAD-END CUT SECTIONS DURING PHASE #2.

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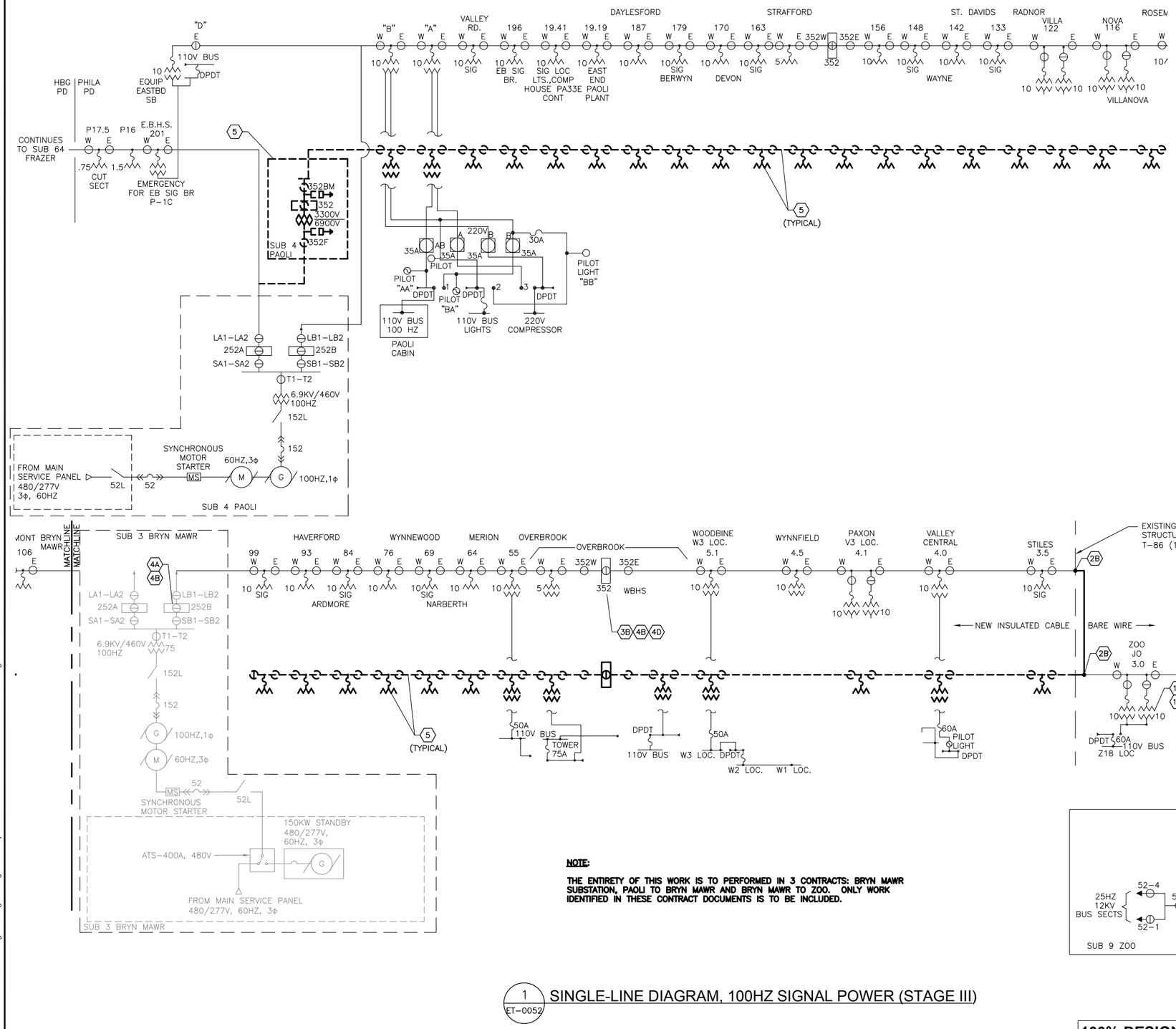
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STAGING PLANS – SIGNAL POWER
100HZ SIGNAL POWER (SHEET 2 OF 3)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-0050-2.DWG
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NOTE:

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1 ET-0052 SINGLE-LINE DIAGRAM, 100HZ SIGNAL POWER (STAGE III)

STAGE III:

1. AT ZOO/JO INTERLOCKING SIGNAL HUT (INSTALL NEW 6900/3300/120V DUAL-TAP TRANSFORMER).
   - 1.A. WITH AMTRAK'S PERMISSION, DE-ENERGIZE SIGNAL HUT AND REMOVE THE CUTOUT UPSTREAM OF THE EXISTING 3300/120V HUT TRANSFORMER.
   - 1.B. REPLACE THE 3300/120V TRANSFORMER WITH A NEW 6900/3300/120V DUAL-TAP TRANSFORMER.
   - 1.C. CIRCUIT THE XFRM SECONDARY TO THE HUT MAIN CIRCUIT BREAKER.
   - 1.D. CONNECT EXISTING 3300V CUTOUT TO 3300V TAP OF THE NEW TRANSFORMER.

   NOTE: THE SIGNAL HUT IS STILL FED FROM THE 3300V SOURCE, BUT WILL BE PREPARED TO ACCOMMODATE 6900V PRIMARY ONCE THE EXISTING SIGNAL POWER CONDUCTORS ARE MIGRATED FROM 3300V TO 6900V.

2. MIGRATE THE BARE 3300V SIGNAL POWER CONDUCTORS TO 6900V CABLE.
   - 2.A. WITH AMTRAK'S PERMISSION, OPEN EXISTING ZOO 252A TO DE-ENERGIZE THE 3300V SIGNAL POWER LINE BETWEEN ZOO SUBSTATION AND STRUCTURE T-86.
   - 2.B. CONNECT EXISTING SIGNAL POWER LINE BETWEEN STRUCTURE T-86 AND ZOO SUBSTATION TO NEW 6900V SIGNAL POWER CABLES AT STRUCTURE T-86.

3. AT ZOO SUBSTATION
   - 3.A. INSTALL, TEST AND COMMISSION NEW 6900/460V SIGNAL POWER TRANSFORMER AND ALL ASSOCIATED EQUIPMENT.
   - 3.B. OPEN OVERBROOK 352 BREAKER AND CLOSE NEW ZOO 252A BREAKER TO ENERGIZE THE 6900V SIGNAL POWER LINE FROM ZOO SUBSTATION TO OVERBROOK.

   NOTE: SIGNAL POWER SYSTEM IS IN FINAL CONFIGURATION.

4. TEST OVERBROOK 352 BREAKER:
   - 4.A. OPEN BRYN MAWR 252B AND VERIFY THAT OVERBROOK 352 CLOSES AUTOMATICALLY.
   - 4.B. OPEN 352 AND CLOSE BRYN MAWR 252B TO RESTORE NORMAL OPERATING CONDITIONS.
   - 4.C. OPEN ZOO 252A AND VERIFY THAT OVERBROOK 352 CLOSES AUTOMATICALLY.
   - 4.D. OPEN 352 AND CLOSE ZOO 252A TO RESTORE NORMAL OPERATING CONDITIONS.

5. REMOVE ALL 3300V EQUIPMENT BETWEEN ZOO SUBSTATION AND PAOLI SUBSTATION.

STAGE III SUMMARY:

AT THE END OF STAGE III:

A. THE OVERBROOK 352 BREAKER HAS BEEN TESTED AND COMMISSIONED.

B. NEW TRANSFORMER AT ZOO SUBSTATION HAS BEEN INSTALLED, TESTED AND COMMISSIONED.

C. THE SIGNAL POWER SYSTEM BETWEEN ZOO SUBSTATION AND FRAZER SUBSTATION IS IN THE FINAL CONFIGURATION.

D. EXISTING 3300V EQUIPMENT HAS BEEN REMOVED.

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET-0012.
2. SEE AMTRAK DRAWING PET-199-12 FOR CONTINUATION OF SIGNAL POWER SYSTEM ALONG HARRISBURG LINE.
3. FOR STAGING WITHIN PAOLI SUBSTATION, SEE DRAWINGS ET-0070 THROUGH ET-0074.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STAGING PLANS - SIGNAL POWER
100HZ SIGNAL POWER (SHEET 3 OF 3)

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

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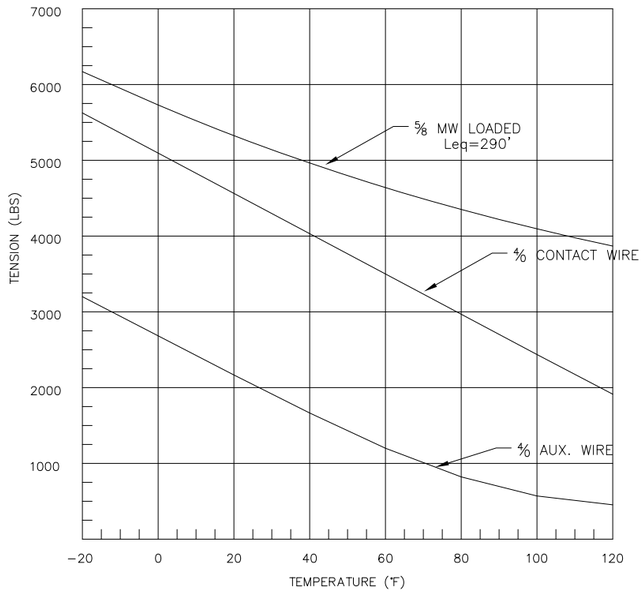
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EXISTING CATENARY DATA (3 WIRE SYSTEM)				
DESIGN ITEM	UNITS	MESSENGER	AUXILLARY WIRE	CONTACT WIRE
CONDUCTOR		5/8" DIA. BRONZE	4/0 GROOVED	4/0 GROOVED
SYMBOL				
MATERIAL		BRONZE	COPPER	BRONZE (ALLOY 55)
DIAMETER	IN	0.625	0.482	0.482
CROSS SECTIONAL AREA	SQ IN	0.233	0.1665	0.1665
WEIGHT OF CONDUCTOR	LB/FT	0.905	0.642	0.642
WEIGHT OF CATENARY (INCLUDING HANGERS)	LB/FT	2.27		
RADIAL THICKNESS OF ICE (PART ICE)	IN	0.500	.500	0.125
WEIGHT OF ICE (PART ICE)	LB/FT	0.699	.611	0.094
WEIGHT OF CATENARY WITH ICE (PART ICE)	LB/FT	3.674		
RADIAL THICKNESS OF ICE (FULL ICE)	IN	0.500	0.500	0.500
WEIGHT OF ICE (FULL ICE)	LB/FT	0.699	0.611	0.611
WEIGHT OF CATENARY WITH ICE (FULL ICE)	LB/FT	4.191		
BREAKING LOAD	LB	25,520	7700	11,490
EQUIVALENT SPAN	FT	290	30	15
TENSIONS AT : 60° F NO WIND	LB	4640	1200	3500
120° F NO WIND	LB	3867	454	1906
0°F NO WIND, FULL ICE	LB	7680	2750	5096
0°F 4 PSF WIND, FULL ICE	LB	7715	2762	5098
MESSENGER SAGS ON 300 FT SPAN AT:				
60° F NO WIND	FT	5.50	–	–
120° F NO WIND	FT	6.55	–	–
0° F NO WIND, FULL ICE	FT	5.75	–	–
MODULUS OF ELASTICITY	PSI	17.00E+06	17.00E+06	17.00E+06
COEFFICIENT OF EXPANSION	/ ° F	9.40E–06	9.40E–06	9.40E–06
MINIMUM FACTOR OF SAFETY		3.3	2.79	2.25

EXISTING CATENARY DATA (2 WIRE SYSTEM)			
DESIGN ITEM	UNITS	MESSENGER	CONTACT WIRE
CONDUCTOR		5/8" DIA. BRONZE	4/0 GROOVED
SYMBOL			
MATERIAL		BRONZE	BRONZE (ALLOY 55)
DIAMETER	IN	0.625	0.482
CROSS SECTIONAL AREA	SQ IN	0.233	0.1665
WEIGHT OF CONDUCTOR	LB/FT	0.905	0.642
WEIGHT OF CATENARY (INCLUDING HANGERS)	LB/FT	1.67	
RADIAL THICKNESS OF ICE (PART ICE)	IN	0.500	0.125
WEIGHT OF ICE (PART ICE)	LB/FT	0.699	0.094
WEIGHT OF CATENARY WITH ICE (PART ICE)	LB/FT	2.275	
RADIAL THICKNESS OF ICE (FULL ICE)	IN	0.500	0.500
WEIGHT OF ICE (FULL ICE)	LB/FT	0.699	0.611
WEIGHT OF CATENARY WITH ICE (FULL ICE)	LB/FT	2.98	
BREAKING LOAD	LB	25,520	11,490
EQUIVALENT SPAN	FT	290	20
TENSIONS AT : 60° F NO WIND	LB	4640	3500
120° F NO WIND	LB	3598	1906
0°F NO WIND, FULL ICE	LB	7355	5096
0°F 4 PSF WIND, FULL ICE	LB	7534	5098
MESSENGER SAGS ON 300 FT SPAN AT:			
60° F NO WIND	FT	4.05	–
120° F NO WIND	FT	5.18	–
0° F NO WIND, FULL ICE	FT	4.55	–
MODULUS OF ELASTICITY	PSI	17.00E+06	17.00E+06
COEFFICIENT OF EXPANSION	/ ° F	9.40E–06	9.40E–06
MINIMUM FACTOR OF SAFETY		3.52	2.25

MAINLINE CATENARY (3 WIRE)
GRAPH OF WIRE TENSION VS TEMPERATURE



EXISTING CATENARY (3 WIRE) WIRE TENSIONS (LBS)			
TEMP. (°F)	Leq=290 FT	Leq=30 FT	Leq=15 FT
	MESSENGER WIRE	AUXILLARY WIRE	CONTACT WIRE
–10	5943	2945	5362
0	5727	2684	5096
10	5521	2424	4830
20	5325	2167	4564
30	5139	1913	4298
40	4964	1665	4032
50	4797	1424	3766
60	4640	1200	3500
70	4492	994	3234
80	4352	822	2968
90	4220	679	2702
100	4096	571	2437
110	3978	500	2171
120	3868	454	1906

EXISTING CATENARY (2 WIRE) WIRE TENSIONS (LBS)		
TEMP. (°F)	Leq=290 FT	Leq=20 FT
	MESSENGER WIRE	CONTACT WIRE
–10	6354	5362
0	6076	5096
10	5810	4830
20	5553	4564
30	5307	4298
40	5075	4032
50	4850	3766
60	4640	3500
70	4442	3234
80	4256	2968
90	4082	2702
100	3919	2437
110	3767	2171
120	3626	1906

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TECHNICAL DATA AND WIRE PARTICULARS (SHEET 1 OF 3)

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0092.DWG
Ref. No.:	2011–059
Sheet No:	028 OF 347

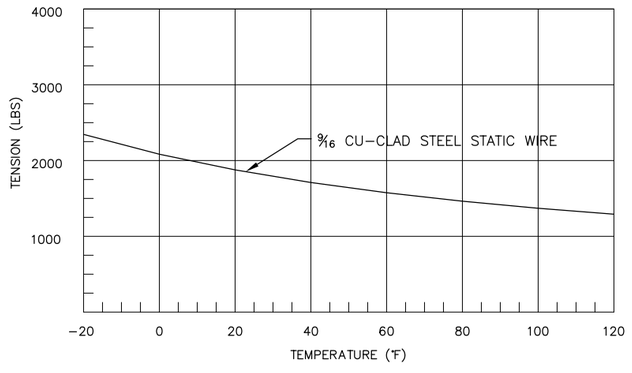
ET–0092

STATIC WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	9/16"ø CU–CLAD STEEL
MATERIAL:	–	COPPERCLAD H.S. STEEL
DIAMETER	IN	0.572
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.195
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.700
TENSION AT 60°F	LB	1575
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.676
WIND LOAD (NO ICE, 90 MPH)	LB/FT	0.991
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.537
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3435
TENSION AT 0°F WITH ICE, NO WIND	LB	3273
TENSION AT –10°F, NO WIND OR ICE	LB	2207
TENSION AT 120°F, NO WIND	LB	1292
BREAKING LOAD	LB	23,390
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.73
–10°F NO ICE, NO WIND	FT	3.57
120°F, NO WIND	FT	6.10
MODULUS OF ELASTICITY	PSI	2900E+6
COEFFICIENT OF EXPANSION	/°F	6.50E–6
MINIMUM FACTOR OF SAFETY	–	–

STATIC WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	4/0 AWG
MATERIAL:	–	HD COPPER
DIAMETER	IN	0.522
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.1662
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.653
TENSION AT 60°F	LB	1470
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.637
WIND LOAD (NO ICE, 90 MPH)	LB/FT	0.874
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.520
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3101
TENSION AT 0°F WITH ICE, NO WIND	LB	2973
TENSION AT –10°F, NO WIND OR ICE	LB	2227
TENSION AT 120°F, NO WIND	LB	1145
BREAKING LOAD	LB	9,154
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.88
–10°F NO ICE, NO WIND	FT	3.36
120°F, NO WIND	FT	6.34
MODULUS OF ELASTICITY	PSI	17.00E+6
COEFFICIENT OF EXPANSION	/°F	9.40E–6
MINIMUM FACTOR OF SAFETY	–	–

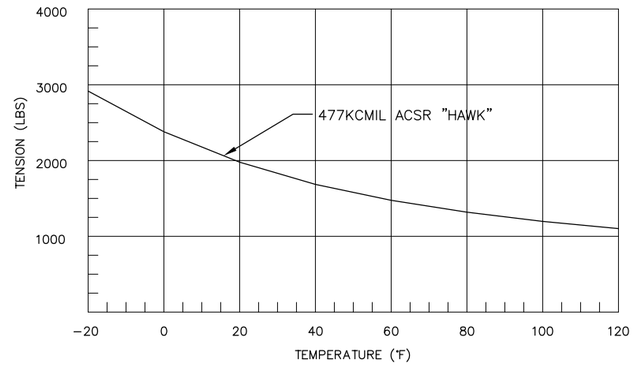
TRANSMISSION WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	477 KCMIL ACSR
MATERIAL: ALUM 26x0.1354, STEEL 7x0.1053	–	HAWK
DIAMETER	IN	0.858
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.4353
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.656
TENSION AT 60°F	LB	1475
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.844
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.487
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.635
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	3899
TENSION AT 0°F WITH ICE, NO WIND	LB	3718
TENSION AT –10°F, NO WIND OR ICE	LB	2632
TENSION AT 120°F, NO WIND	LB	1102
BREAKING LOAD	LB	19,430
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.56
–10°F NO ICE, NO WIND	FT	3.10
120°F, NO WIND	FT	6.61
MODULUS OF ELASTICITY	PSI	10.10E+6
COEFFICIENT OF EXPANSION	/°F	10.55E–6
MINIMUM FACTOR OF SAFETY	–	–

9/16 CU–CLAD STEEL STATIC WIRE
GRAPH OF WIRE TENSION VS TEMPERATURE



9/16 STATIC WIRE WIRE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT STATIC WIRE
–20	2345
–10	2207
0	2084
10	1975
20	1877
30	1789
40	1710
50	1639
60	1575
70	1517
80	1464
90	1415
100	1371
110	1330
120	1292

477 KCMIL ACSR "HAWK" TRANSMISSION WIRE
GRAPH OF WIRE TENSION VS TEMPERATURE



477 KCMIL ACSR WIRE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT TRANSMISSION WIRE
–20	2917
–10	2632
0	2380
10	2163
20	1978
30	1820
40	1686
50	1573
60	1475
70	1391
80	1318
90	1254
100	1197
110	1147
120	1102

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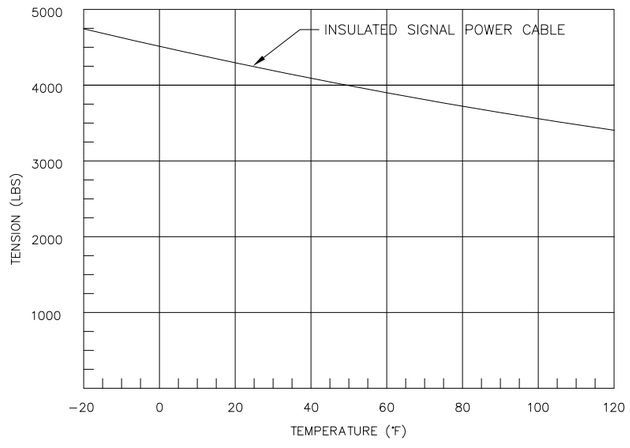
ET–0093

INSULATED SIGNAL POWER WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	2C #2 AWG
MATERIAL: 3/8 EHS & 2C #2 AWG CU	–	HD COPPER
VERTICAL DIMENSION	IN	2.584
CROSS SECTIONAL AREA	SQ. IN.	–
UNIT WEIGHT OF CONDUCTOR	LB/FT	1.738
TENSION AT 60°F	LB	3900
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	1.814
WIND LOAD (NO ICE, 90 MPH)	LB/FT	4.466
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	1.225
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	6439
TENSION AT 0°F WITH ICE, NO WIND	LB	6257
TENSION AT −10°F, NO WIND OR ICE	LB	4626
TENSION AT 120°F, NO WIND	LB	3405
BREAKING LOAD	LB	15,400
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.01
0F WITH 1/2" RADIAL ICE, NO WIND	FT	6.39
−10°F NO ICE, NO WIND	FT	4.25
120°F, NO WIND	FT	5.74
MODULUS OF ELASTICITY	PSI	29E+6
COEFFICIENT OF EXPANSION	/°F	6.5E−6
MINIMUM FACTOR OF SAFETY	–	2.39

OPTICAL GROUND WIRE (FOG)		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR – ALCOA	–	S1−129/44/725
MATERIAL:	–	ALUM/SS TUBE/STEEL
DIAMETER	IN	0.725
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.413
UNIT WEIGHT OF CONDUCTOR	LB/FT	0.486
FINAL TENSION AT 60°F	LB	1630
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.772
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.214
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.589
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	4167
TENSION AT 0°F WITH ICE, NO WIND	LB	3994
TENSION AT −10°F, NO WIND OR ICE	LB	2959
TENSION AT 120°F, NO WIND	LB	1222
BREAKING LOAD	LB	20,288
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	5.00
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.25
−10°F NO ICE, NO WIND	FT	2.85
120°F, NO WIND	FT	6.59
MODULUS OF ELASTICITY	PSI	13.938E+6
COEFFICIENT OF EXPANSION	/°F	10.2E−6
MINIMUM FACTOR OF SAFETY	–	–

FEEDER WIRE		
DESCRIPTION	UNITS	CONDUCTOR
MAKE UP OF CONDUCTOR	–	400 kcmil
MATERIAL	–	HD COPPER
DIAMETER	IN	0.728
CROSS SECTIONAL AREA TOTAL	SQ. IN.	0.3142
UNIT WEIGHT OF CONDUCTOR	LB/FT	1.235
TENSION AT 60°F	LB	2790
EQUIVALENT SPAN	FT	290
MAXIMUM SPAN	FT	–
RADIAL ICE THICKNESS	IN	0.50
WEIGHT OF 1/2" RADIAL ICE	LB/FT	0.764
WIND LOAD (NO ICE, 90 MPH)	LB/FT	1.258
WIND LOAD (1/2" ICE, 40 MPH)	LB/FT	0.59
TENSION AT 0°F WITH ICE & 40 MPH WIND	LB	5155
TENSION AT 0°F WITH ICE, NO WIND	LB	5039
TENSION AT −10°F, NO WIND OR ICE	LB	4231
TENSION AT 120°F, NO WIND	LB	2170
BREAKING LOAD	LB	18,320
CONDUCTOR SAGS ON 300 FT SPAN AT:		
60°F, NO WIND	FT	4.98
0°F WITH 1/2" RADIAL ICE, NO WIND	FT	4.45
−10°F NO ICE, NO WIND	FT	3.35
120°F, NO WIND	FT	6.33
MODULUS OF ELASTICITY	PSI	17E+6
COEFFICIENT OF EXPANSION	/°F	9.40E−6
MINIMUM FACTOR OF SAFETY	–	–

INSULATED SIGNAL POWER CABLE
GRAPH OF WIRE TENSION VS TEMPERATURE



INSULATED SIGNAL POWER CABLE TENSIONS (LBS)	
TEMP. (°F)	Leq=290 FT INSULATED SIGNAL POWER CABLE
−20	4743
−10	4626
0	4512
10	4402
20	4295
30	4191
40	4091
50	3994
60	3900
70	3810
80	3722
90	3638
100	3558
110	3480
120	3405

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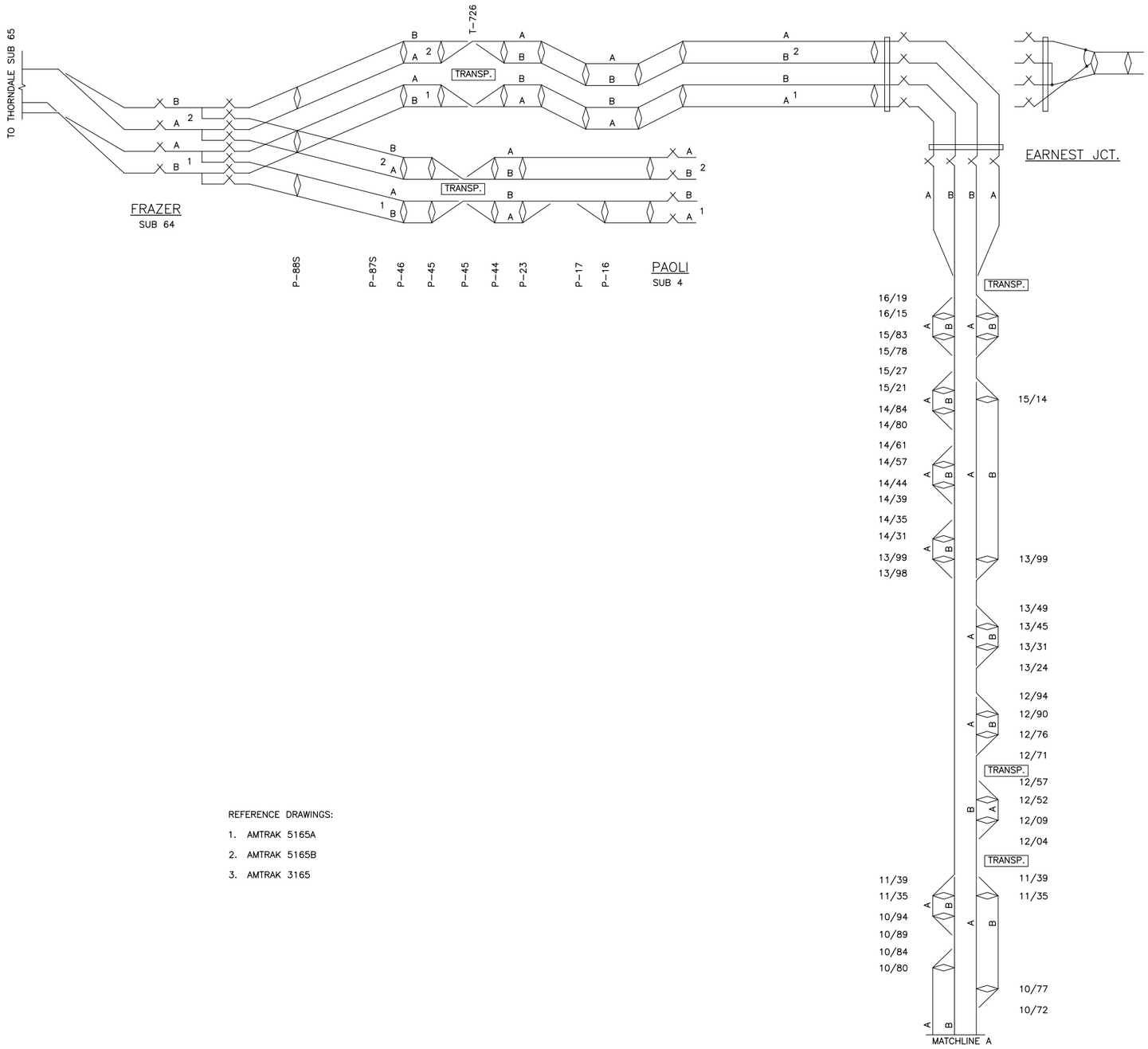
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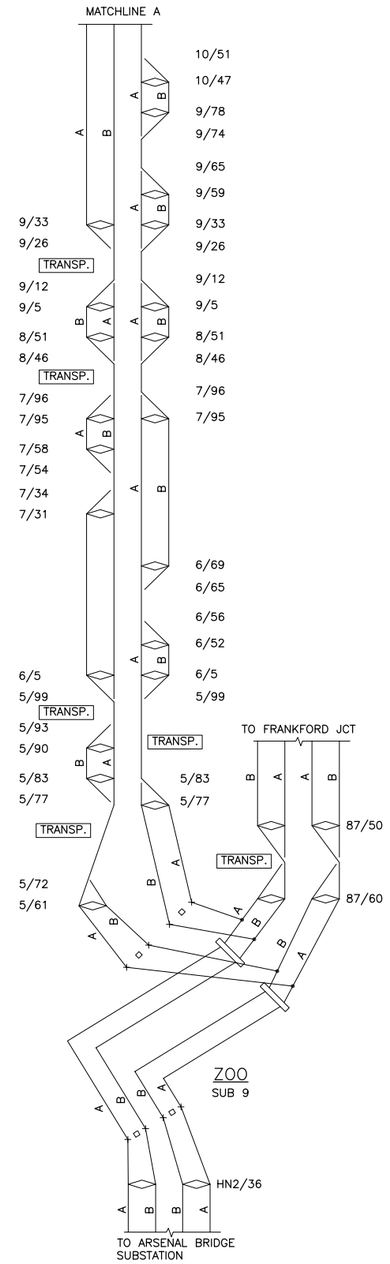
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REFERENCE DRAWINGS:

1. AMTRAK 5165A
2. AMTRAK 5165B
3. AMTRAK 3165

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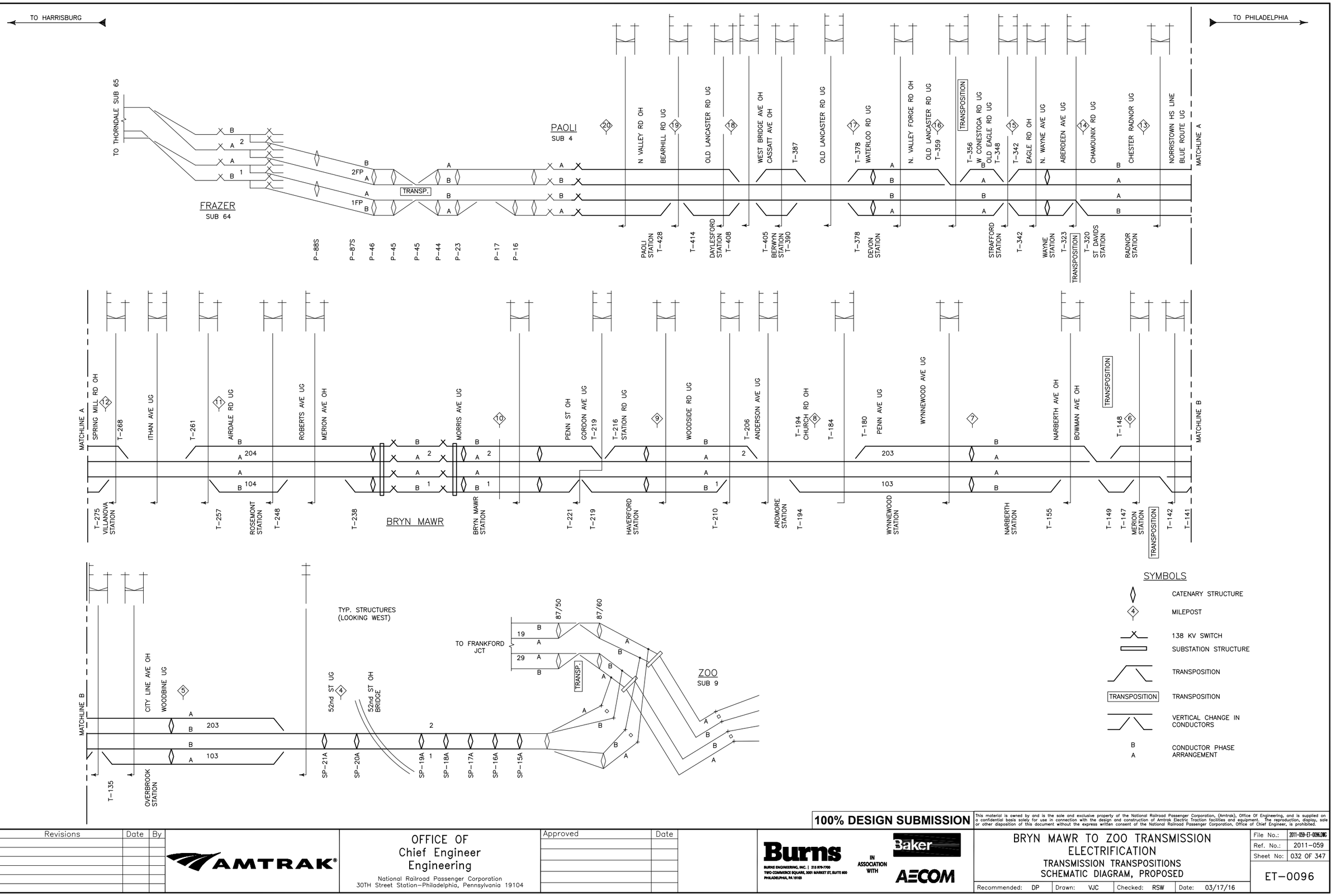
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION TRANSPOSITIONS SCHEMATIC DIAGRAM, EXISTING

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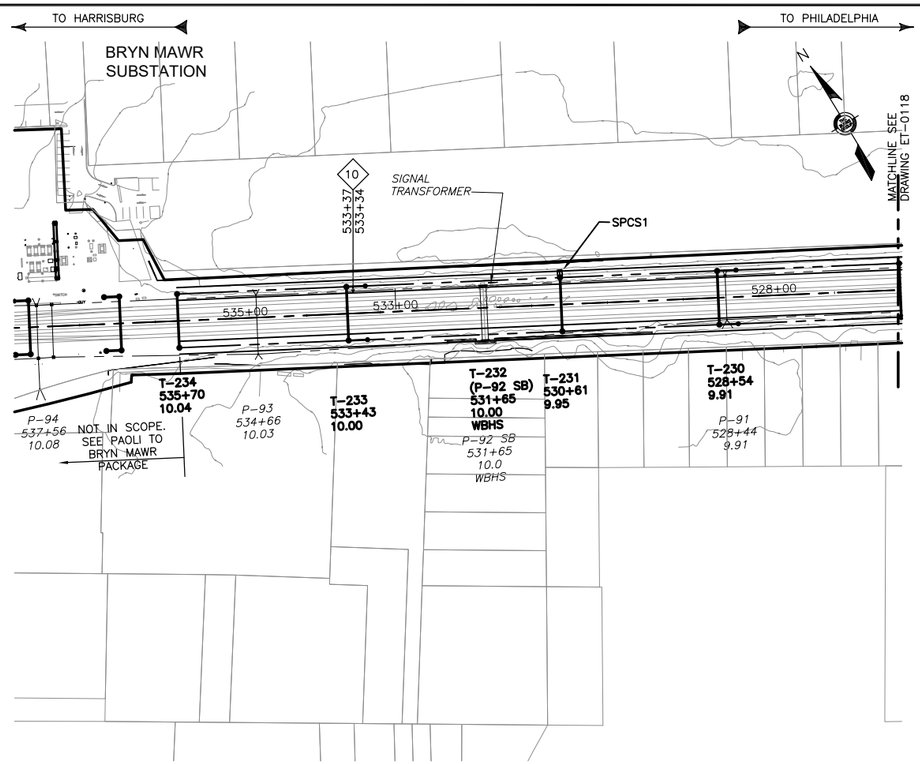
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION TRANSPOSITIONS SCHEMATIC DIAGRAM, PROPOSED

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File No.:	2011-059-ET-0096.DWG
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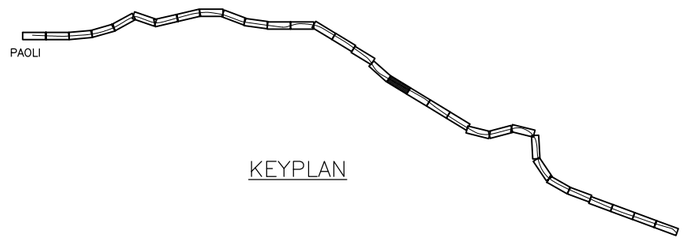
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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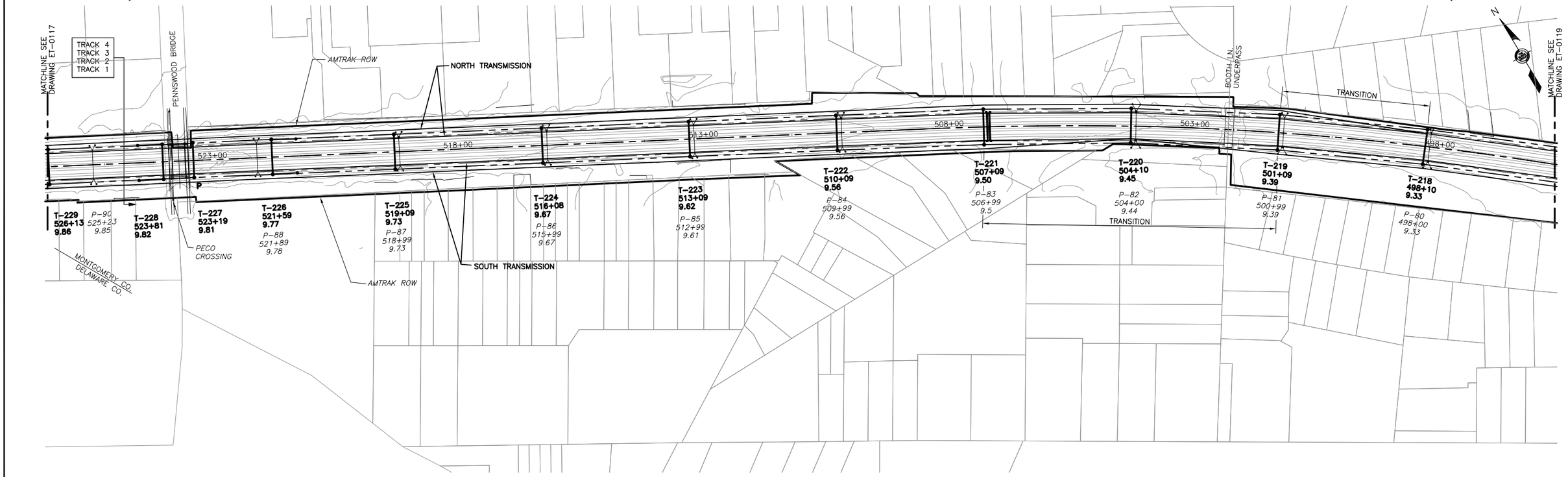
TRANSMISSION LINE SITE PLAN
STA 556+65 TO 526+00

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File No.:	2011-059-ET-0117.DWG
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ET-0117

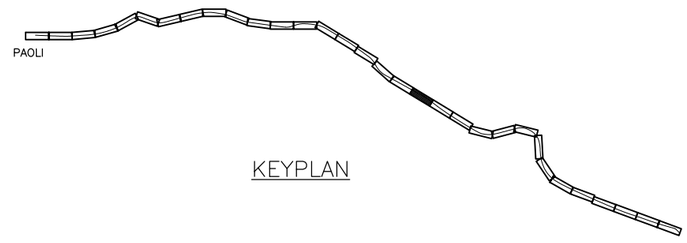
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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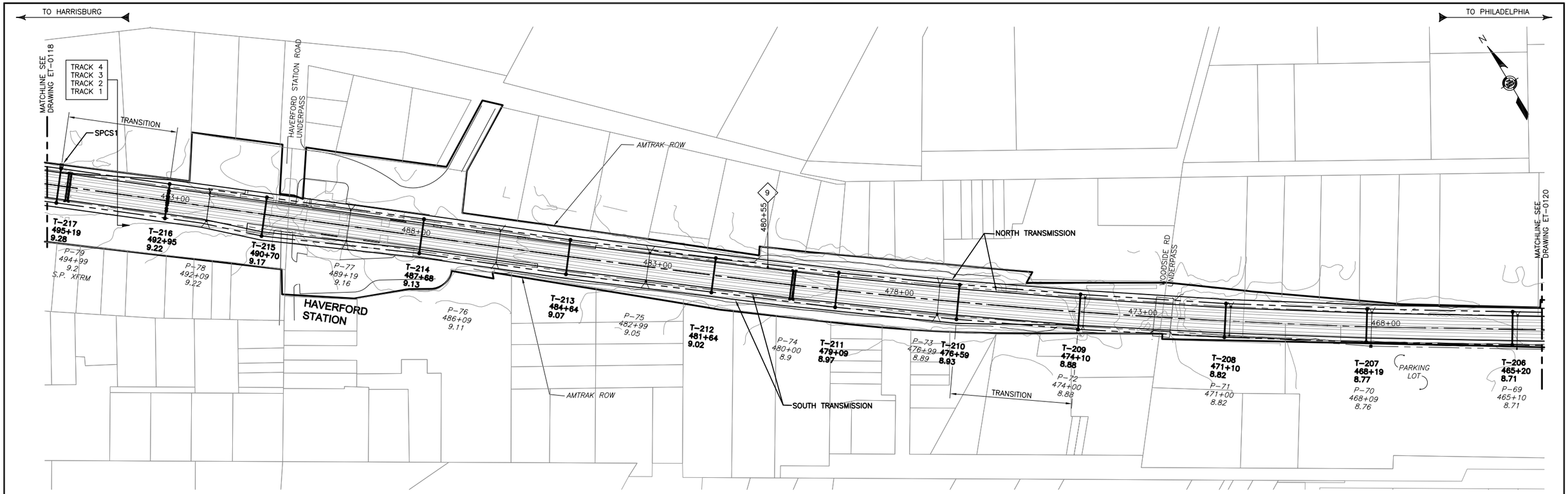
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 526+00 TO 495+50

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0118.DWG
Ref. No.:	2011-059
Sheet No:	034 OF 347

ET-0118

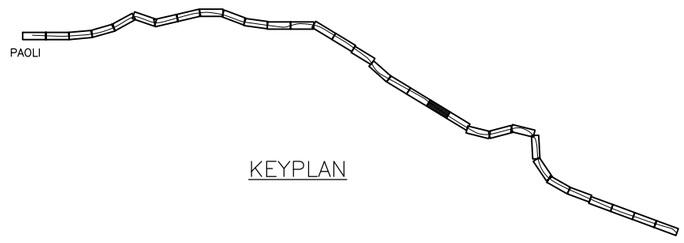
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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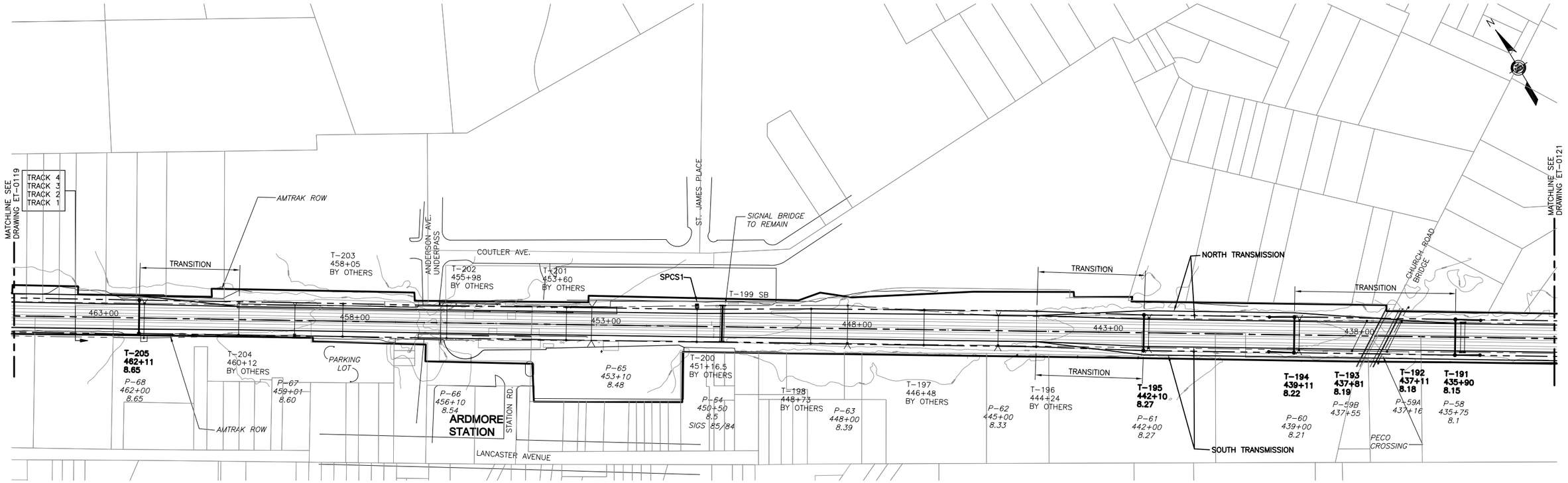
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 495+50 TO 465+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0119.DWG
Ref. No.:	2011-059
Sheet No:	035 OF 347

ET-0119

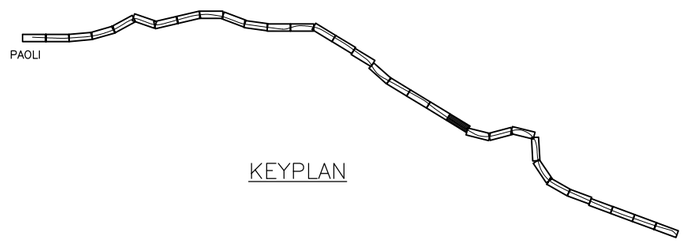
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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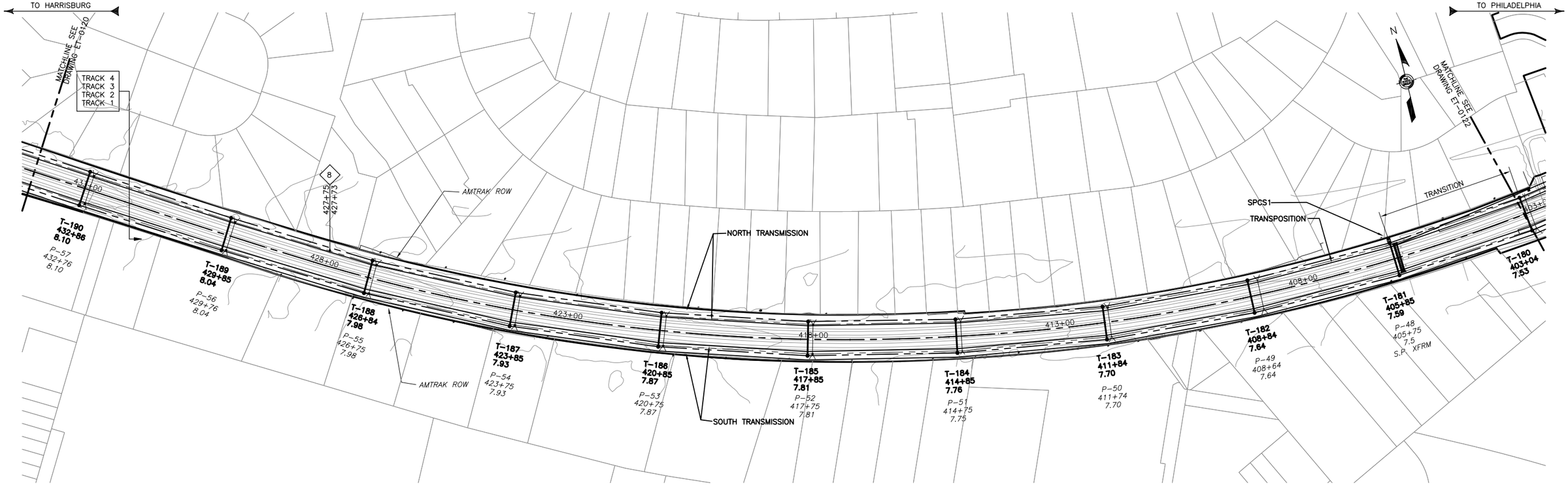
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 465+00 TO 434+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0120.DWG
Ref. No.:	2011-059
Sheet No:	036 OF 347

ET-0120

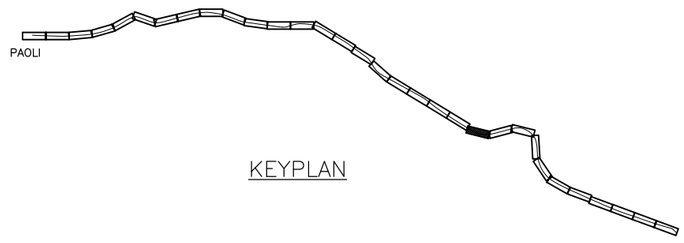
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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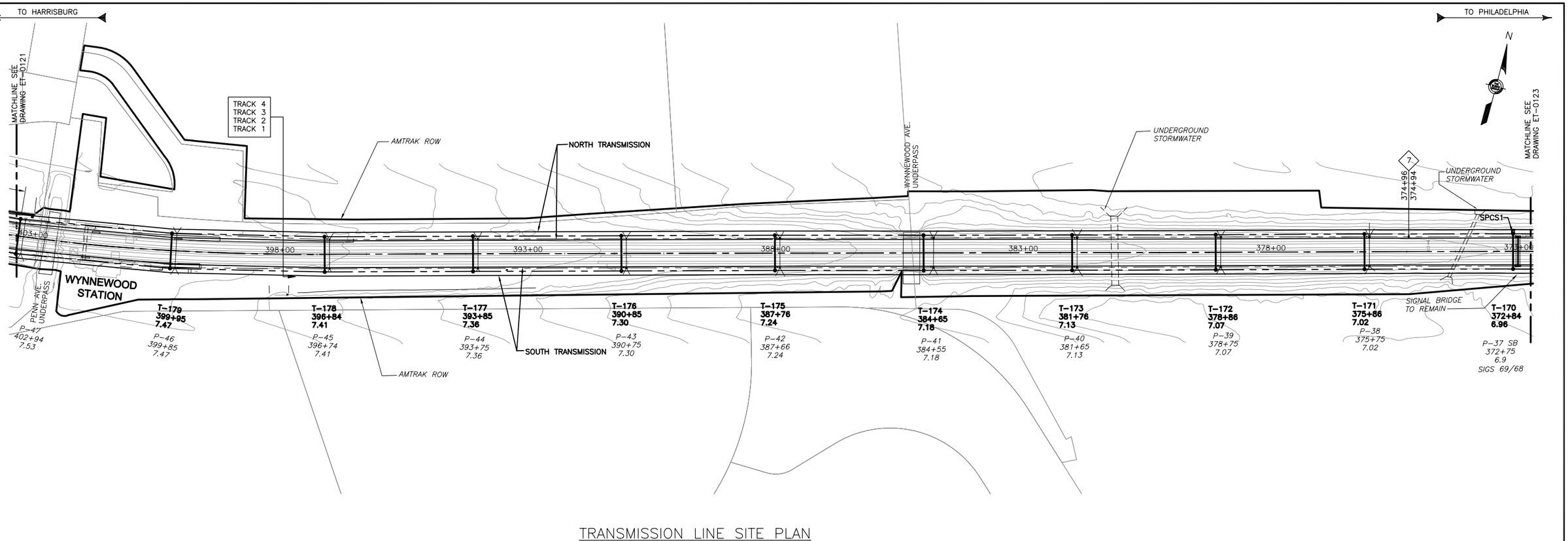
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 434+00 TO 403+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0121.DWG
Ref. No.:	2011-059
Sheet No:	037 OF 347

ET-0121

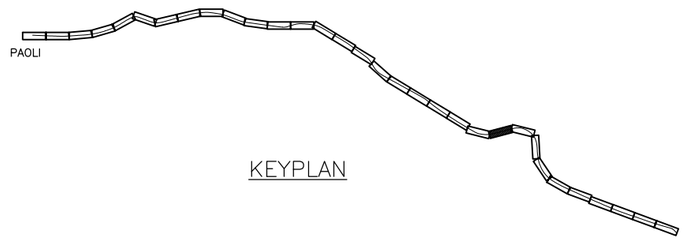
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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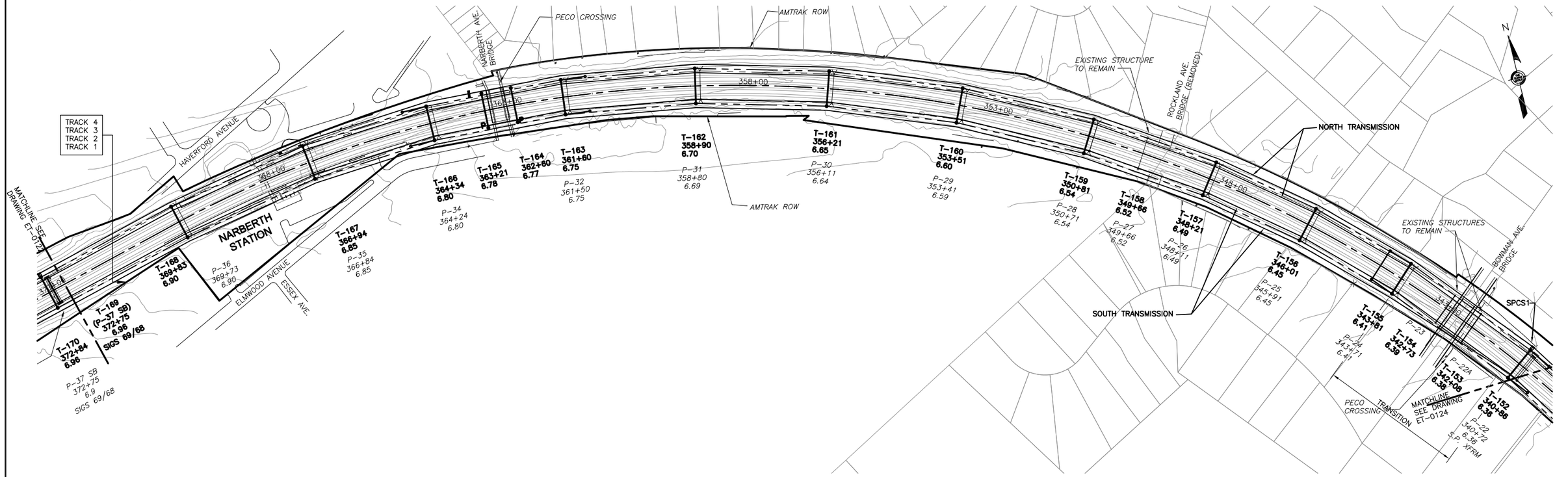
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 403+00 TO 372+50

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-0122.DWG
Ref. No.:	2011-059
Sheet No:	038 OF 347

ET-0122

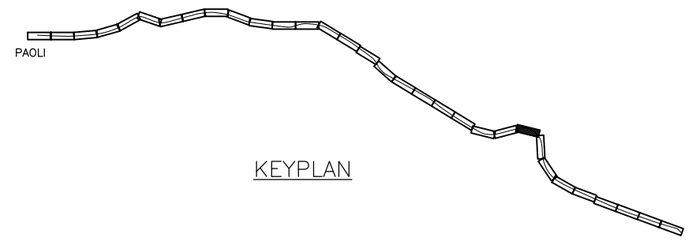
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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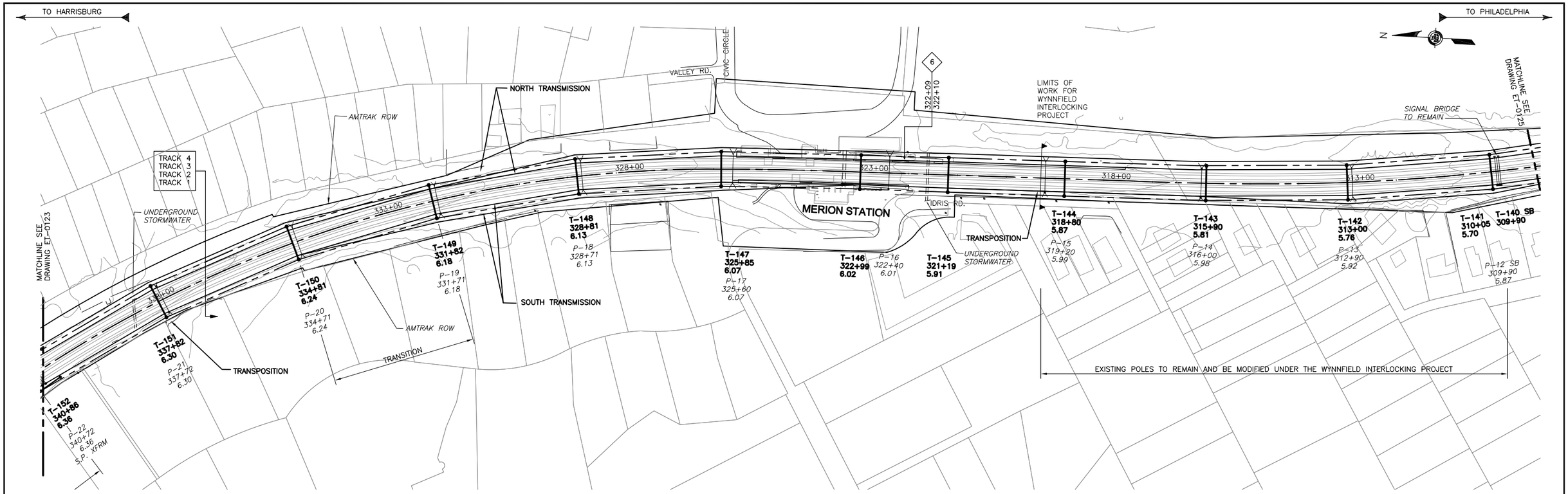
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 372+50 TO 340+70

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0123.DWG
Ref. No.:	2011-059
Sheet No:	039 OF 347

ET-0123

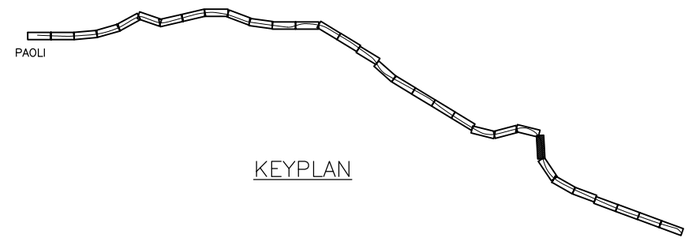
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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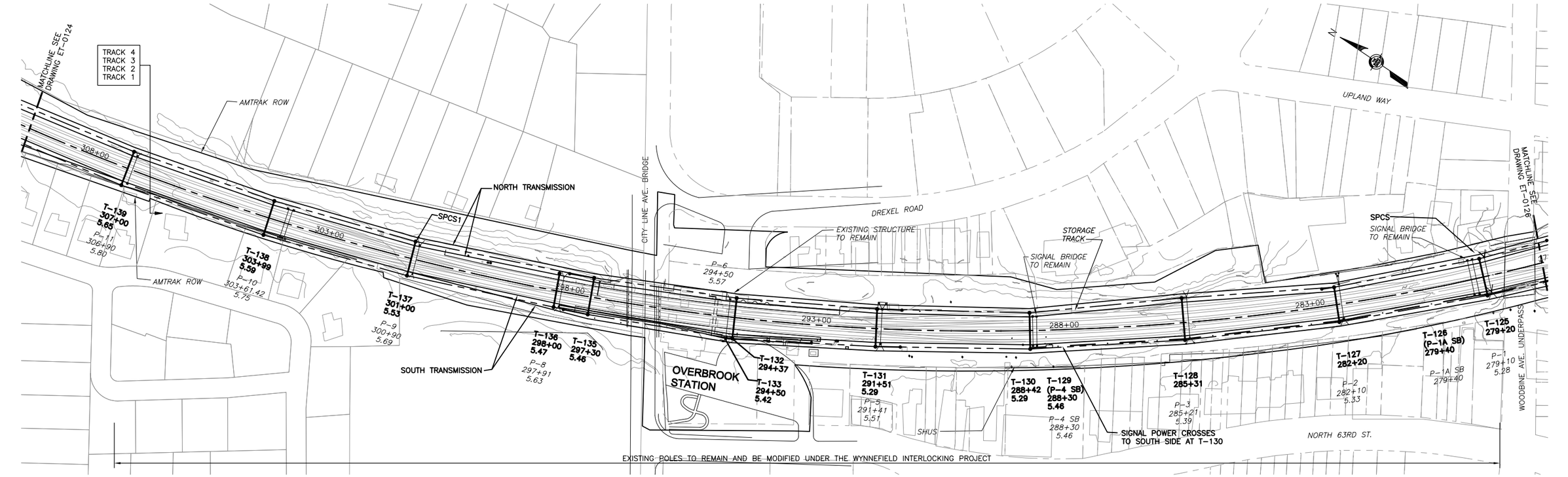
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 340+70 TO 309+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0124.DWG
Ref. No.:	2011-059
Sheet No:	040 OF 347

ET-0124

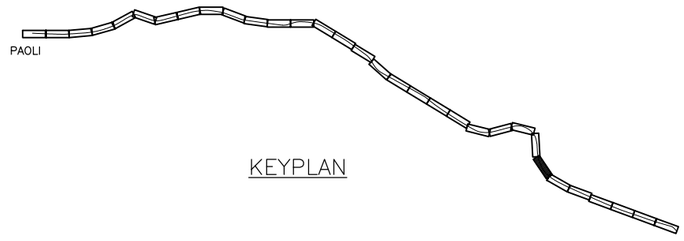
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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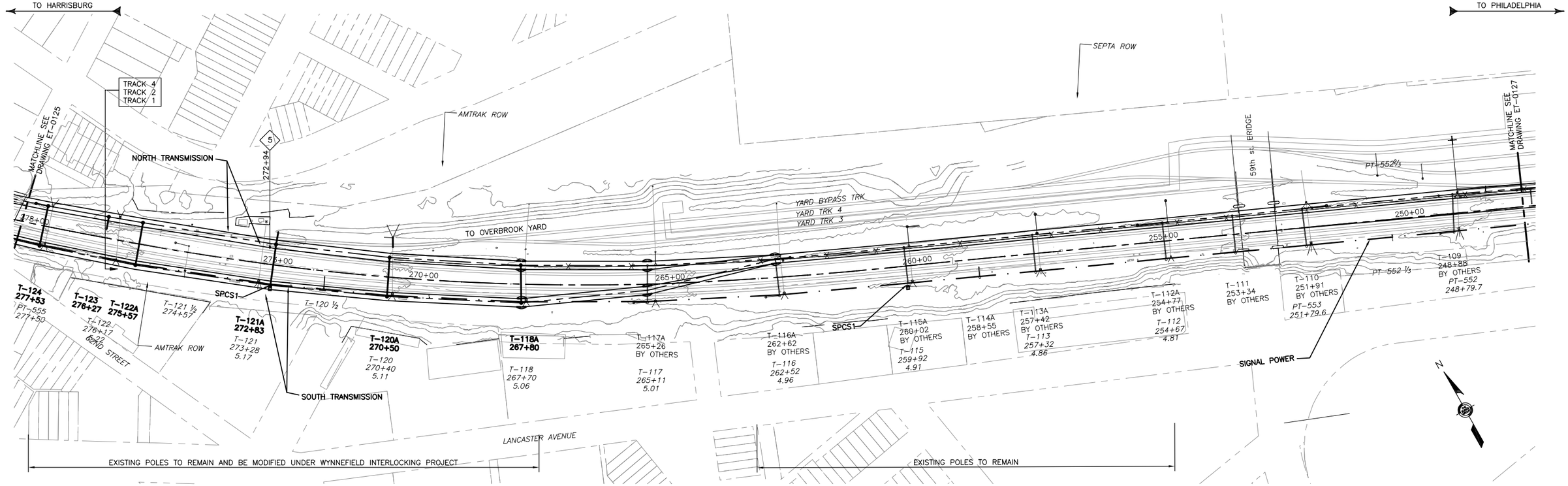
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 309+00 TO 278+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0125.DWG
Ref. No.:	2011-059
Sheet No:	041 OF 347

ET-0125

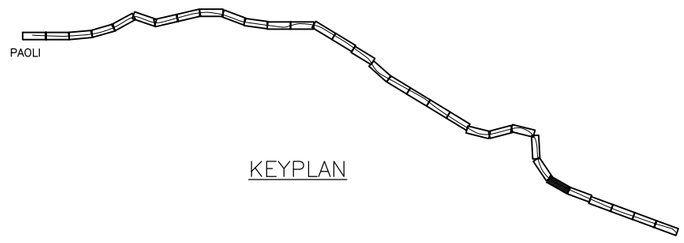
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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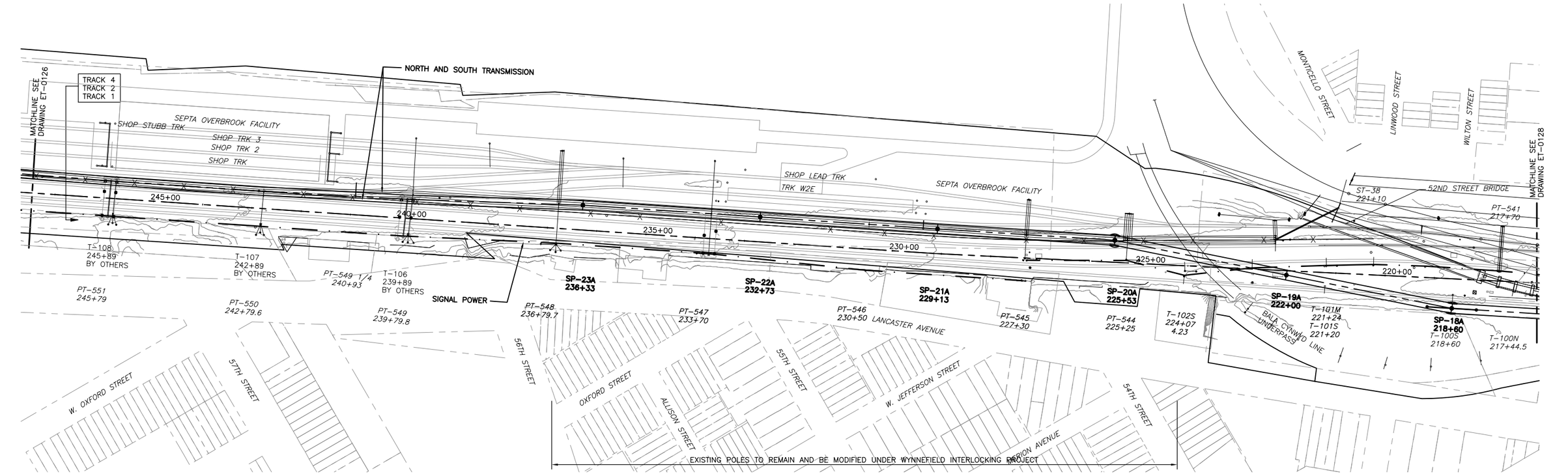
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 278+00 TO 247+50

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0126.DWG
Ref. No.:	2011-059
Sheet No:	042 OF 347

ET-0126

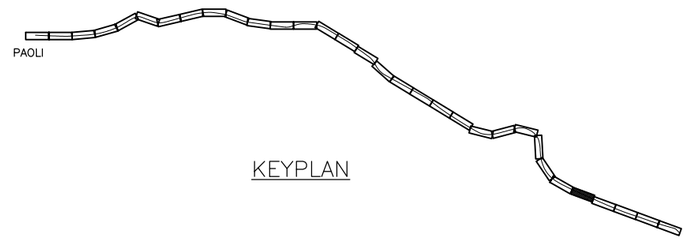
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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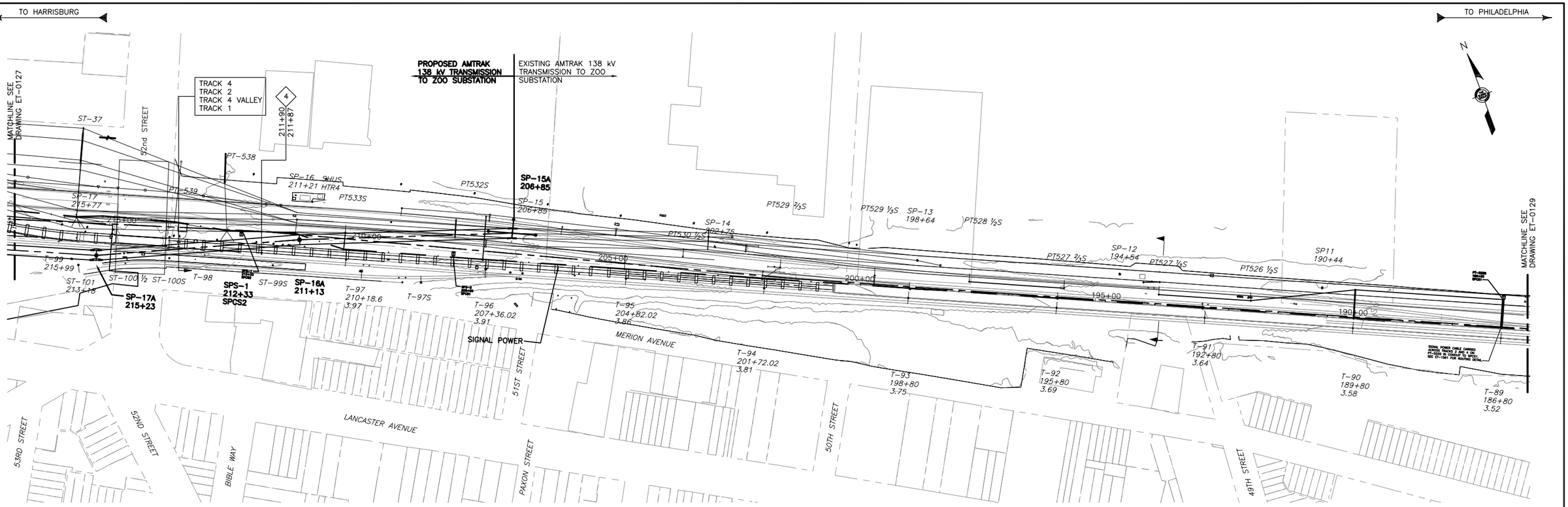
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 247+50 TO 217+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0127.DWG
Ref. No.:	2011-059
Sheet No:	043 OF 347

ET-0127

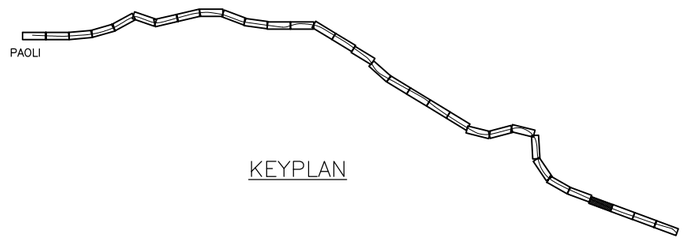
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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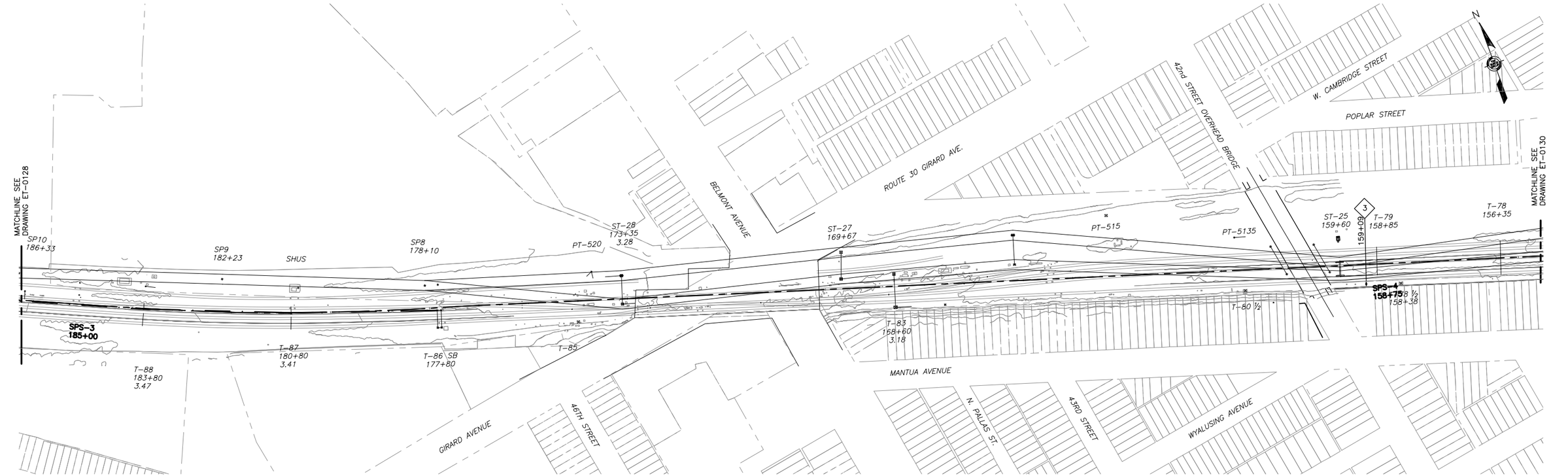
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 217+00 TO 186+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0128.DWG
Ref. No.:	2011-059
Sheet No:	044 OF 347

ET-0128

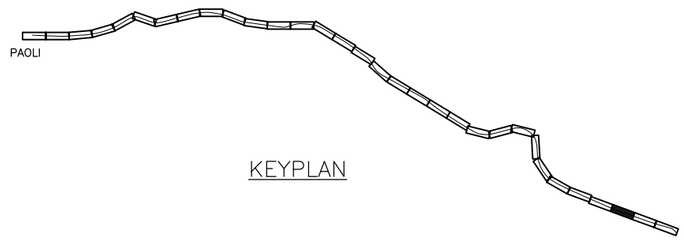
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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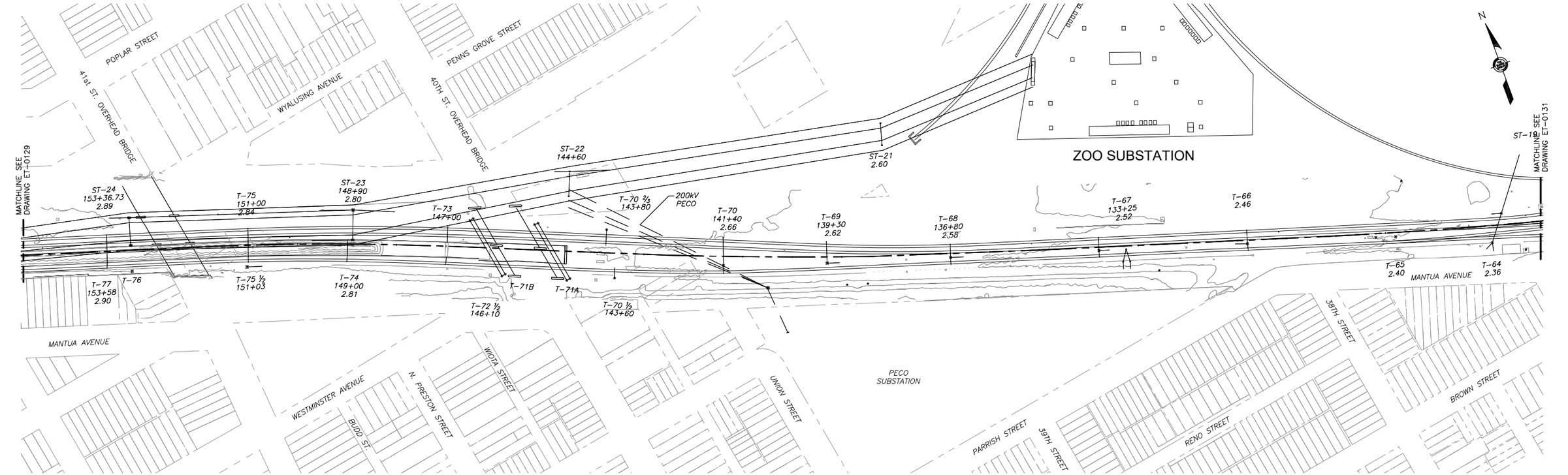
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA. 186+00 TO 156+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0129.DWG
Ref. No.:	2011-059
Sheet No:	045 OF 347

ET-0129

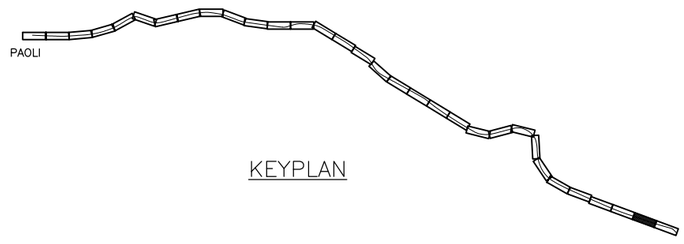
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TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

100% DESIGN SUBMISSION

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
STA 156+00 TO MP 2.35

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

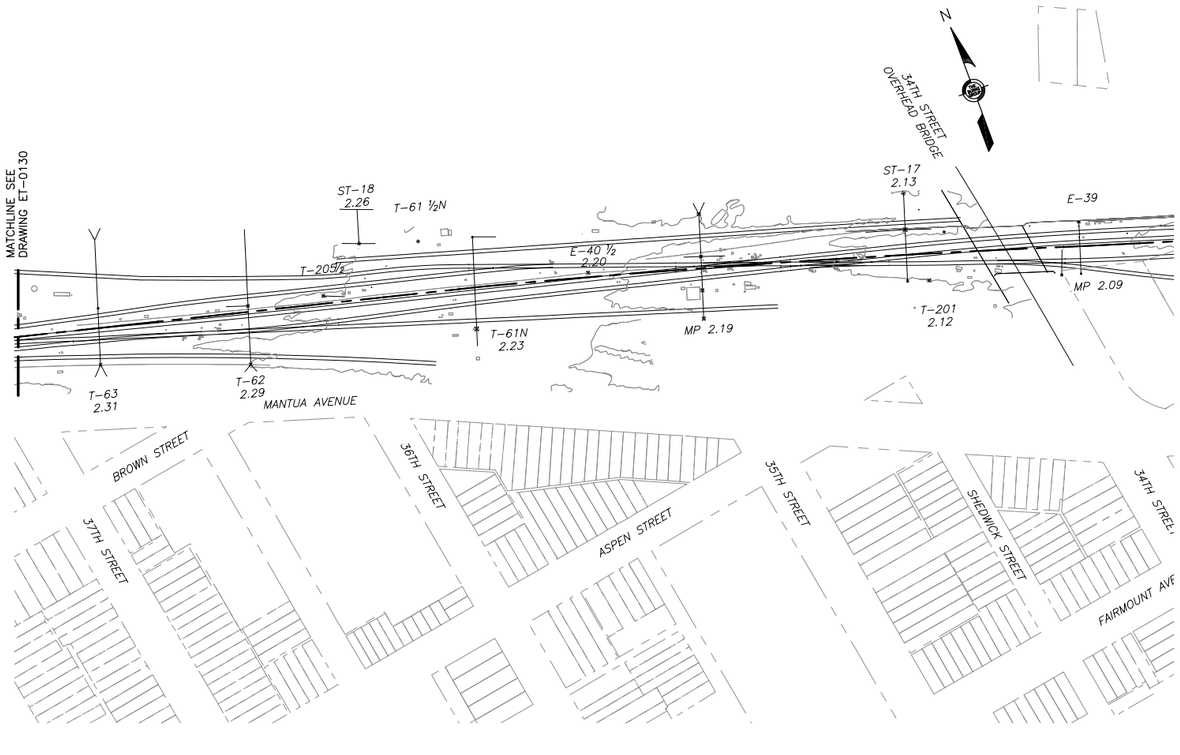
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Ref. No.:	2011-059
Sheet No:	046 OF 347

ET-0130

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TO HARRISBURG

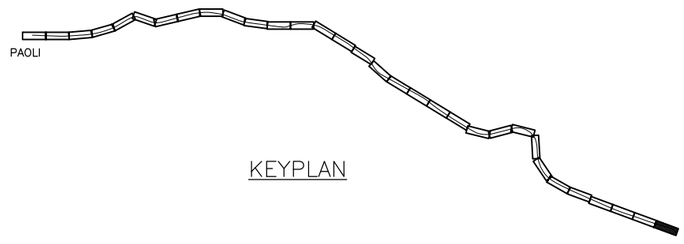
TO PHILADELPHIA



TRANSMISSION LINE SITE PLAN

100' 50' 0 100'

SCALE: 1"=100'-0"



KEYPLAN

PHILADELPHIA

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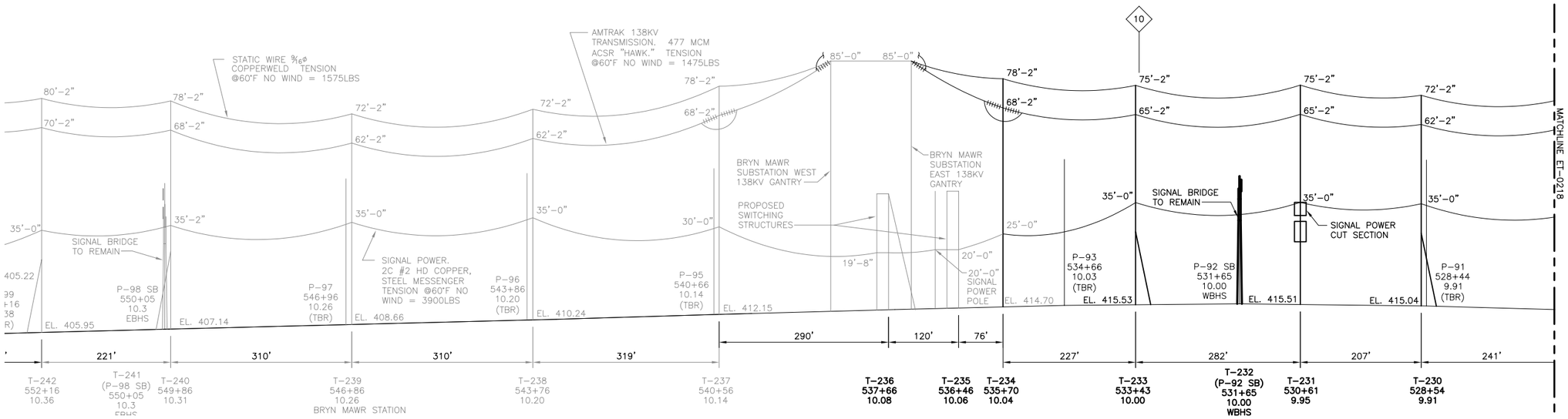
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION LINE SITE PLAN
MP 2.35 TO MP 2.09

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

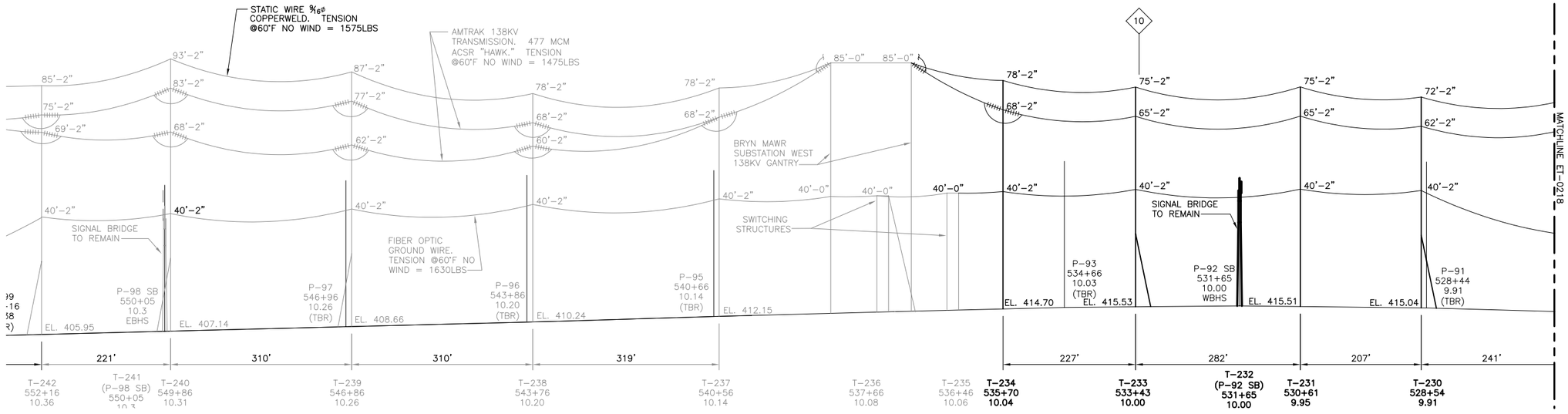
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Ref. No.:	2011-059
Sheet No:	047 OF 347

ET-0131

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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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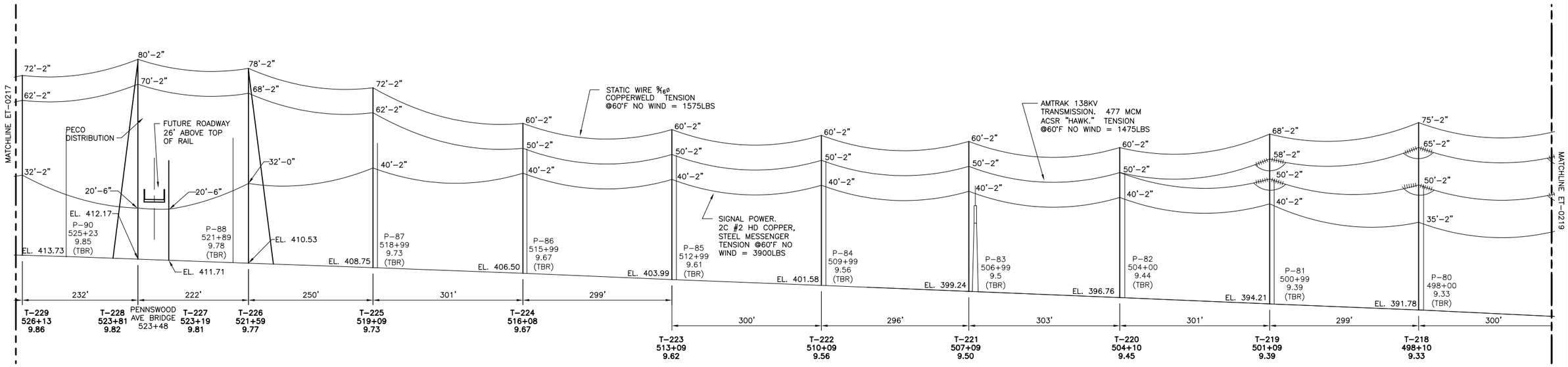
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 556+66 TO 525+35

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

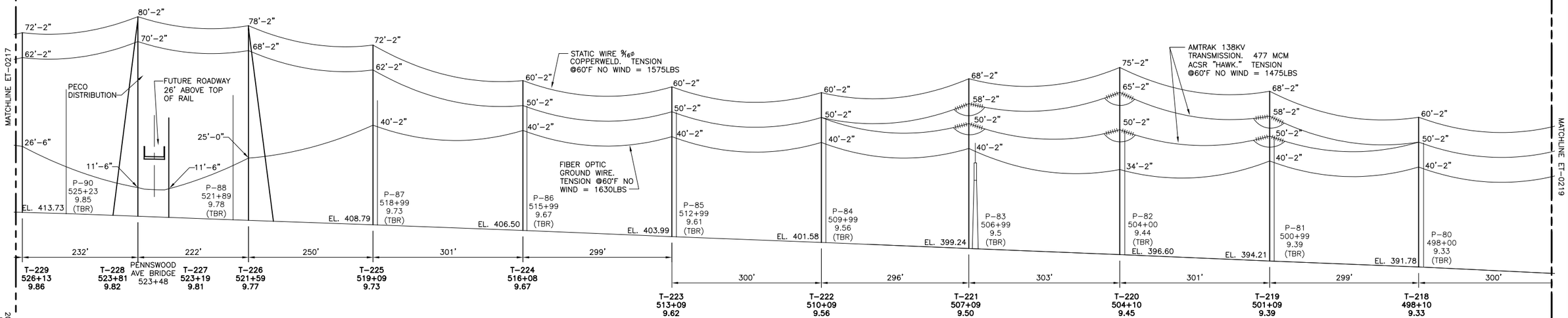
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Ref. No.:	2011-059
Sheet No:	048 OF 347

ET-0217

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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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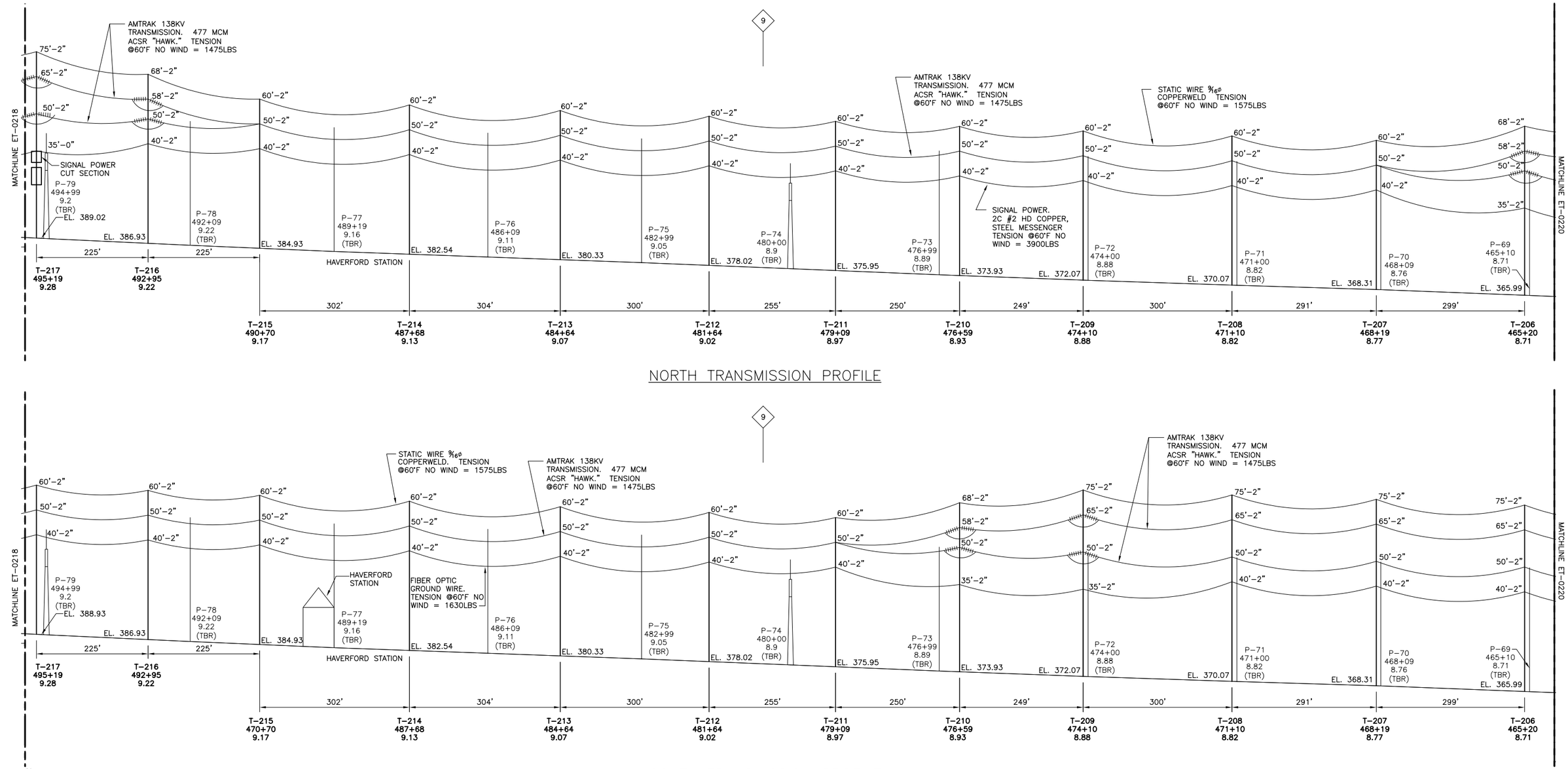
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA. 525+35 TO 495+50

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0218.DWG
Ref. No.:	2011-059
Sheet No:	049 OF 347

ET-0218



NORTH TRANSMISSION PROFILE

SOUTH TRANSMISSION PROFILE

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SCALE:1"=100'-0"

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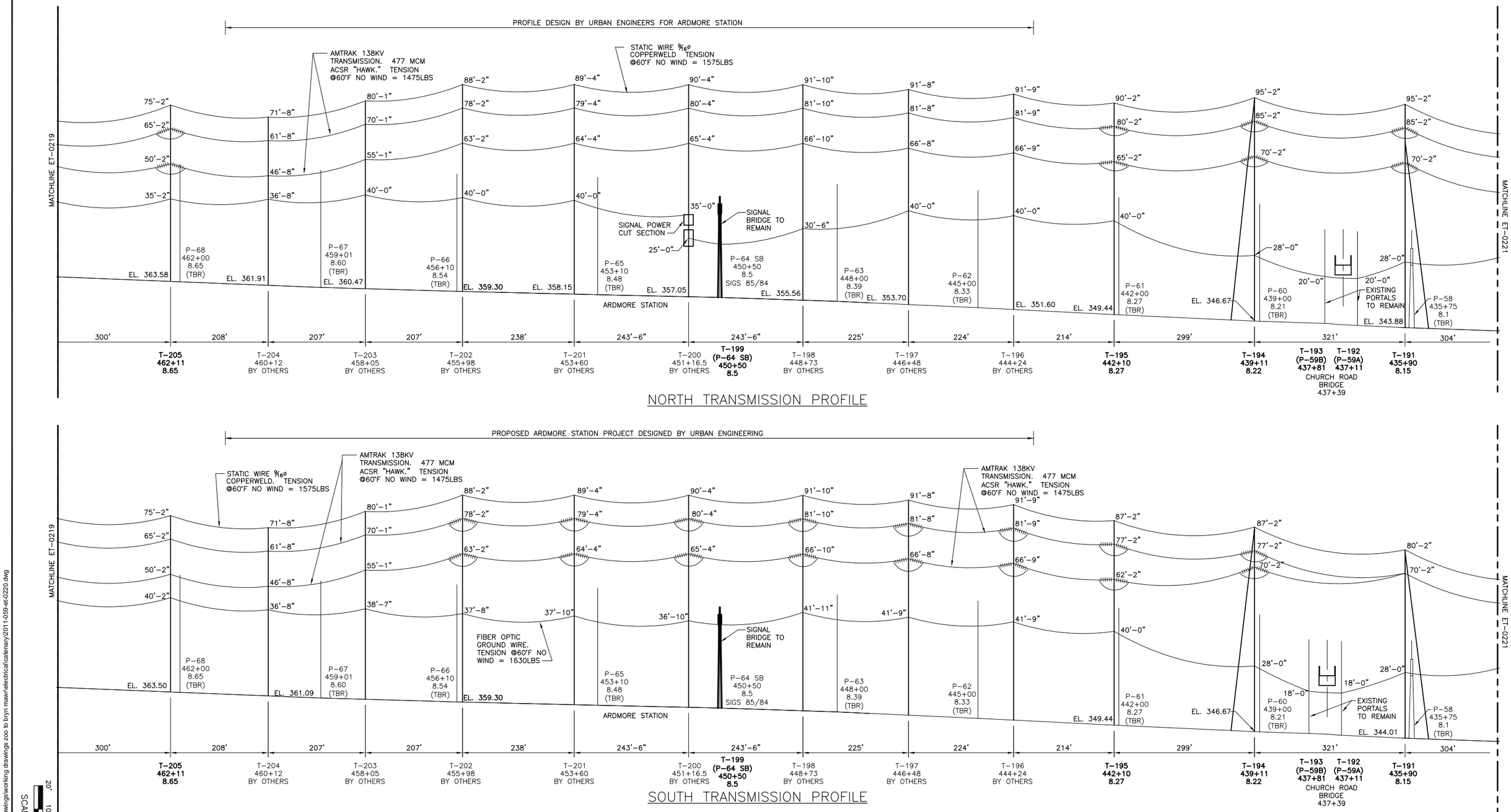
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA. 495+50 TO 465+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0219.DWG
Ref. No.:	2011-059
Sheet No:	050 OF 347

ET-0219

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NORTH TRANSMISSION PROFILE

SOUTH TRANSMISSION PROFILE

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TRANSMISSION PROFILE
STA. 465+00 TO 434+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-0220.DWG
Ref. No.:	2011-059
Sheet No:	051 OF 347

ET-0220

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TO HARRISBURG

TO PHILADELPHIA

MATCHLINE ET-0220

MATCHLINE ET-0222

85'-2"
75'-2"
60'-2"
50'-2"
40'-2"
65'-2"
35'-2"
35'-0"

AMTRAK 138KV TRANSMISSION. 477 MCM ACSR "HAWK." TENSION @60°F NO WIND = 1475LBS

STATIC WIRE 3/16ø COPPERWELD TENSION @60°F NO WIND = 1575LBS

AMTRAK 138KV TRANSMISSION. 477 MCM ACSR "HAWK." TENSION @60°F NO WIND = 1475LBS

SIGNAL POWER. 2C #2 HD COPPER, STEEL MESSENGER TENSION @60°F NO WIND = 3900LBS

SIGNAL POWER CUT SECTION

P-57 432+76 8.10 (TBR)	P-56 429+76 8.04 (TBR)	P-55 426+75 7.98 (TBR)	P-54 423+75 7.93 (TBR)	P-53 420+75 7.87 (TBR)	P-52 417+75 7.81 (TBR)	P-51 414+75 7.75 (TBR)	P-50 411+74 7.70 (TBR)	P-49 408+64 7.64 (TBR)	P-48 405+75 7.5 (TBR)	
EL. 341.77	EL. 339.39	EL. 337.27	EL. 334.97	EL. 332.97	EL. 330.53	EL. 328.03	EL. 325.26	EL. 322.20	EL. 319.32	
300'	302'	299'	300'	300'	300'	301'	300'	299'	281'	
T-190 432+86 8.10	T-189 429+85 8.04	T-188 426+84 7.98	T-187 423+85 7.93	T-186 420+85 7.87	T-185 417+85 7.81	T-184 414+85 7.76	T-183 411+84 7.70	T-182 408+84 7.64	T-181 405+85 7.59	

NORTH TRANSMISSION PROFILE

70'-2"
60'-2"
50'-2"
40'-2"

AMTRAK 138KV TRANSMISSION. 477 MCM ACSR "HAWK." TENSION @60°F NO WIND = 1475LBS

STATIC WIRE 3/16ø COPPERWELD. TENSION @60°F NO WIND = 1575LBS

FIBER OPTIC GROUND WIRE. TENSION @60°F NO WIND = 1630LBS

P-57 432+76 8.10 (TBR)	P-56 429+76 8.04 (TBR)	P-55 426+75 7.98 (TBR)	P-54 423+75 7.93 (TBR)	P-53 420+75 7.87 (TBR)	P-52 417+75 7.81 (TBR)	P-51 414+75 7.75 (TBR)	P-50 411+74 7.70 (TBR)	P-49 408+64 7.64 (TBR)	P-48 405+75 7.5 (TBR)	
EL. 341.77	EL. 339.39	EL. 337.27	EL. 334.97	EL. 332.97	EL. 330.53	EL. 328.03	EL. 325.26	EL. 322.20	EL. 319.66	
300'	302'	299'	300'	300'	300'	301'	300'	299'	281'	
T-190 432+86 8.10	T-189 429+85 8.04	T-188 426+84 7.98	T-187 423+85 7.93	T-186 420+85 7.87	T-185 417+85 7.81	T-184 414+85 7.76	T-183 411+84 7.70	T-182 408+84 7.64	T-181 405+85 7.59	

SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA. 434+00 TO 403+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

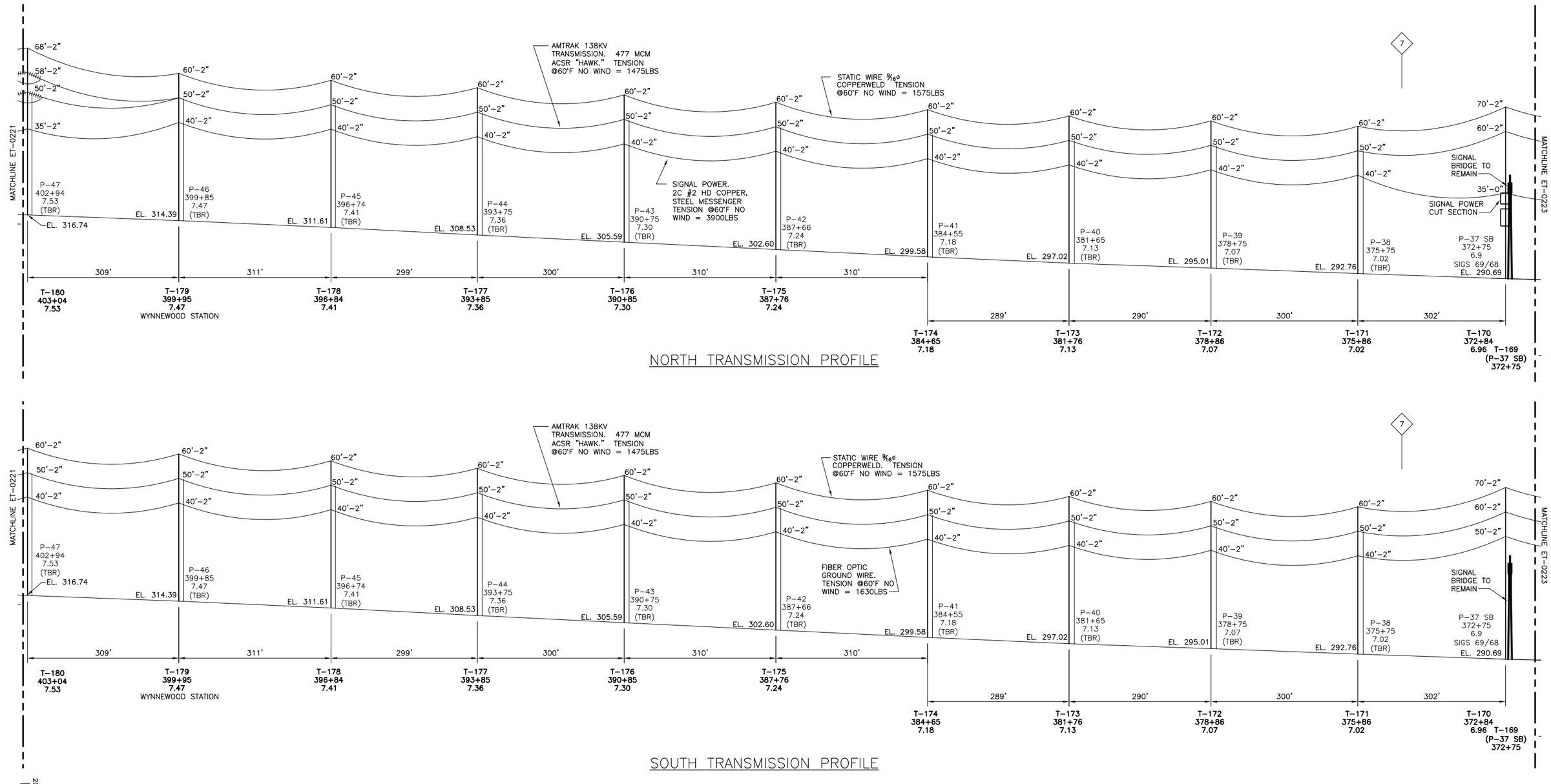
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Ref. No.:	2011-059
Sheet No:	052 OF 347

ET-0221

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TO HARRISBURG

TO PHILADELPHIA



NORTH TRANSMISSION PROFILE

SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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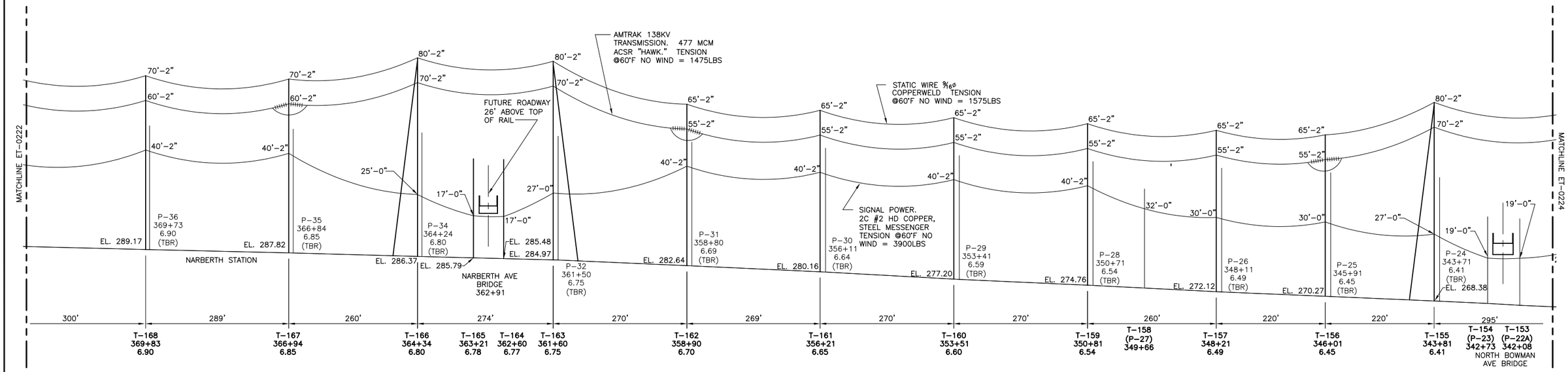
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE
STA. 403+00 TO 372+50

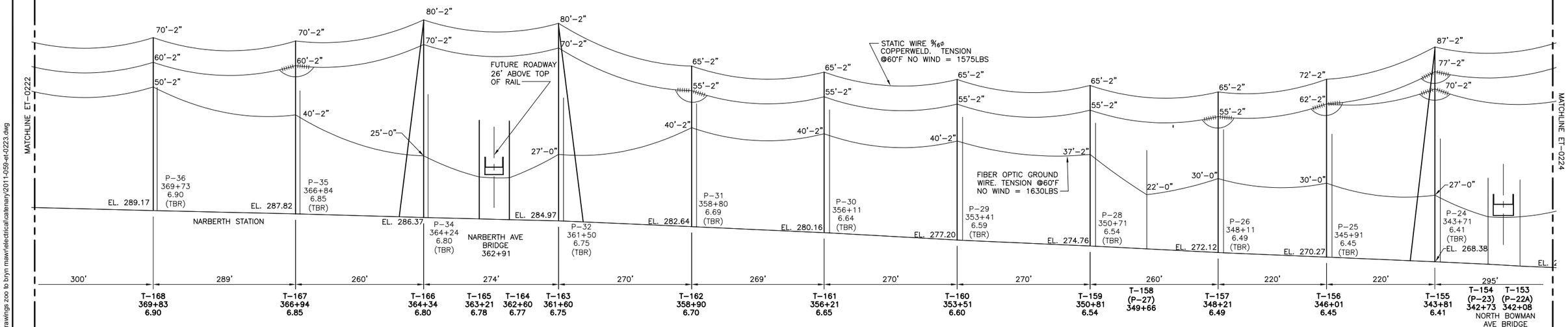
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File No.:	2011-059-ET-0222.DWG
Ref. No.:	2011-059
Sheet No:	053 OF 347

ET-0222



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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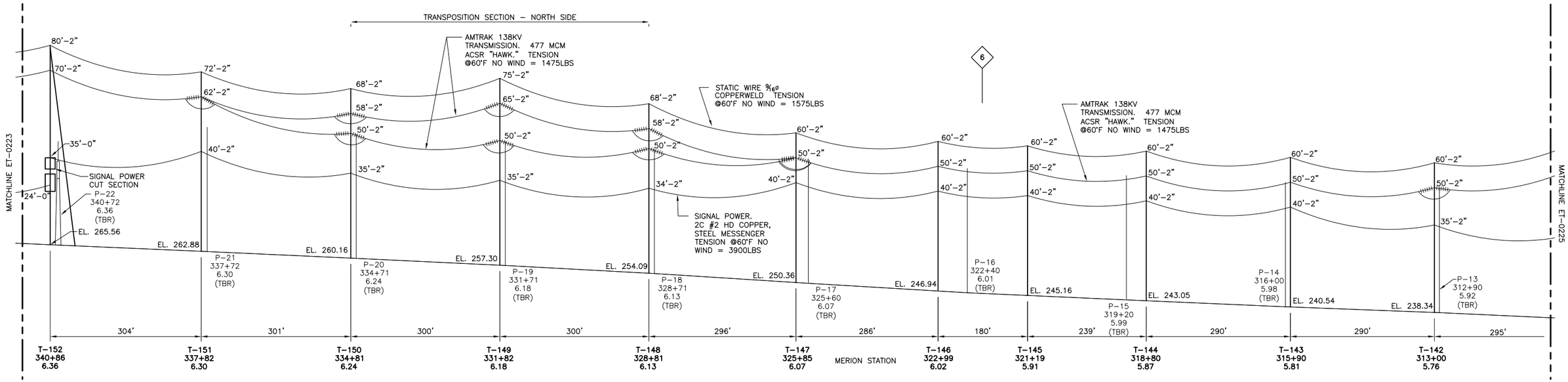
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE STA. 372+50 TO 340+70

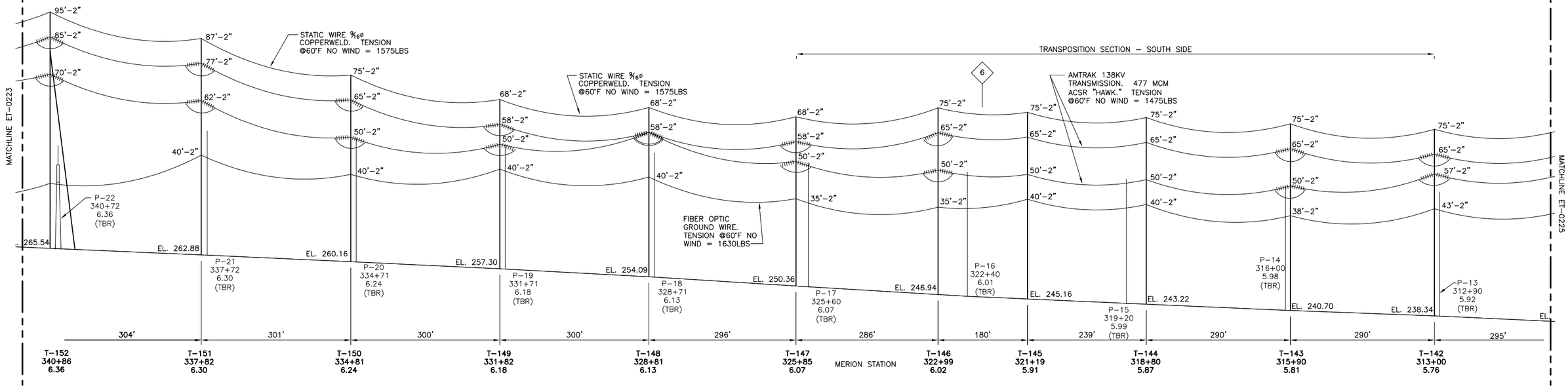
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File No.:	2011-059-ET-0223.DWG
Ref. No.:	2011-059
Sheet No:	054 OF 347

ET-0223



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

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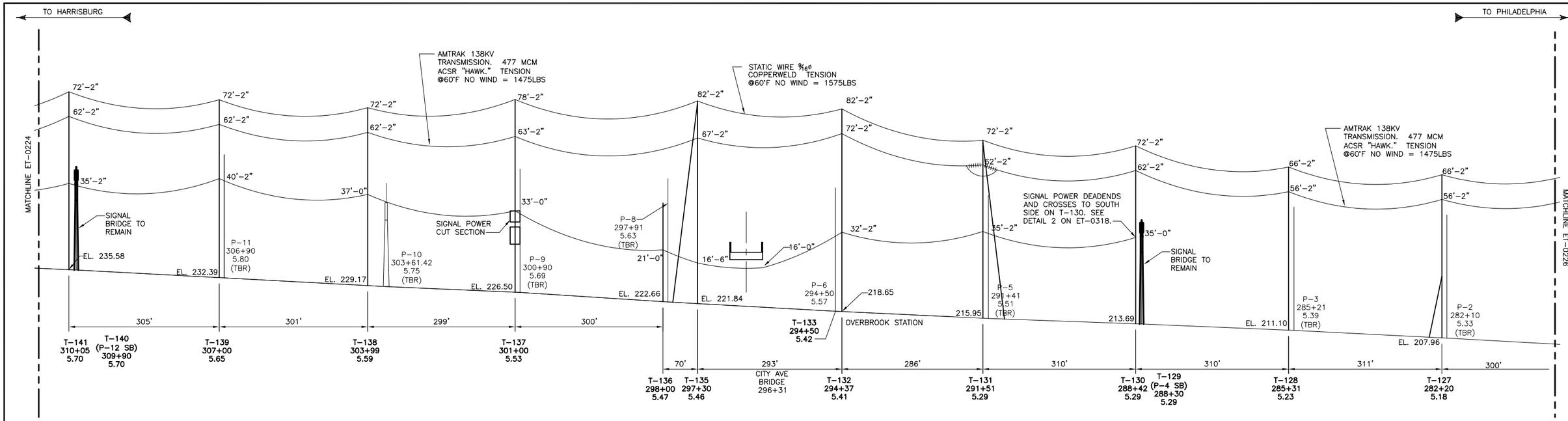
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA. 340+70 TO 309+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

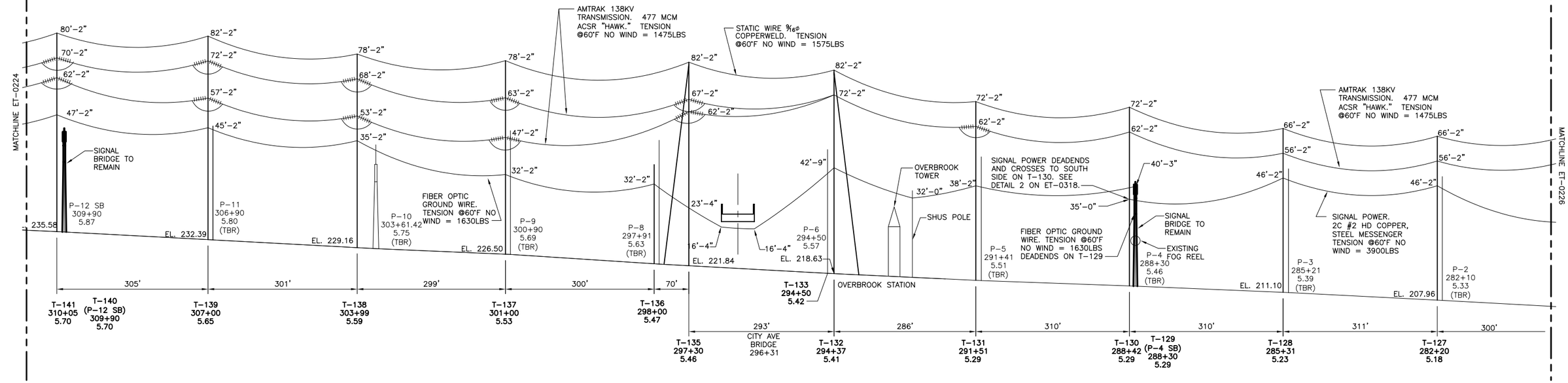
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Sheet No:	055 OF 347

ET-0224

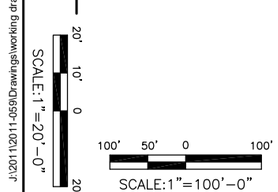
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NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE



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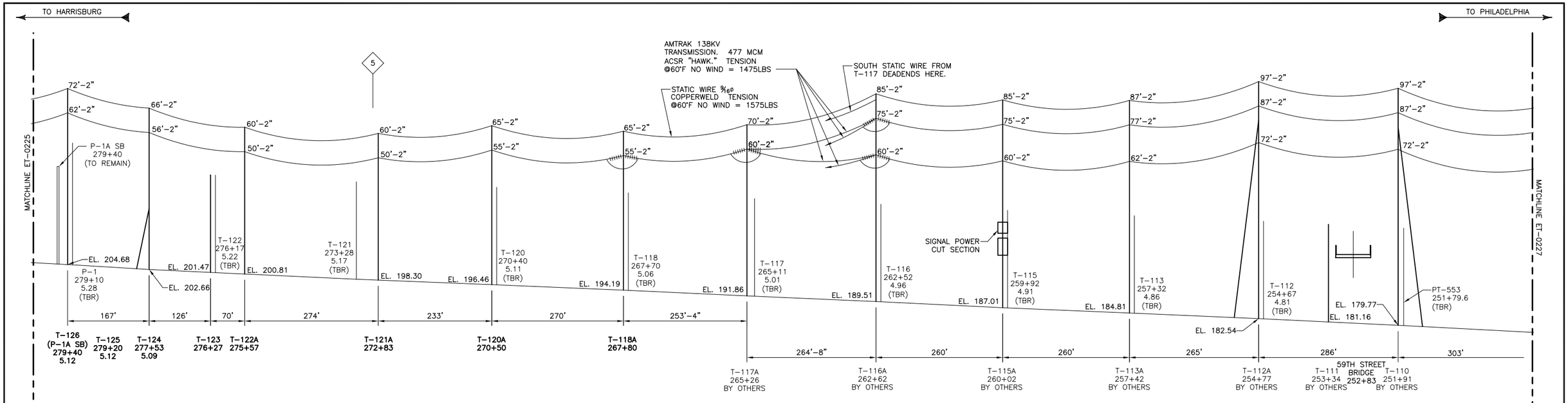
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA. 309+00 TO 278+00

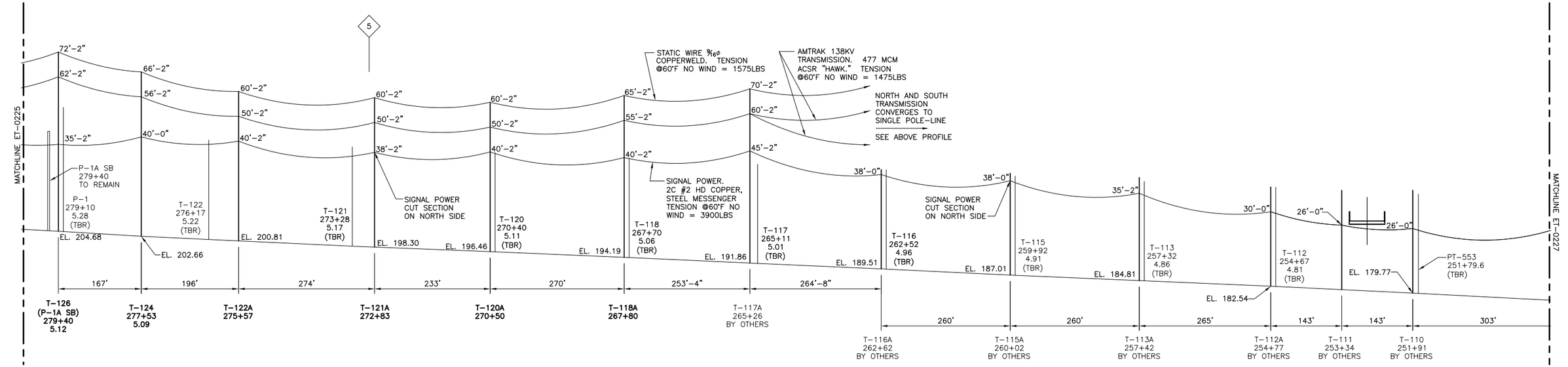
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File No.:	2011-059-ET-0225.DWG
Ref. No.:	2011-059
Sheet No:	056 OF 347

ET-0225



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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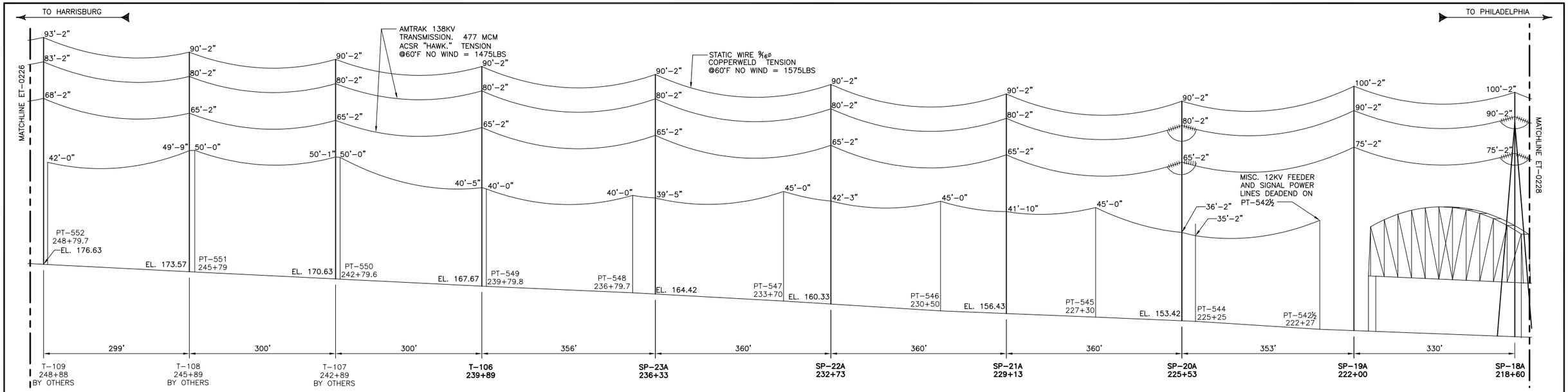
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE STA 278+00 TO 247+00

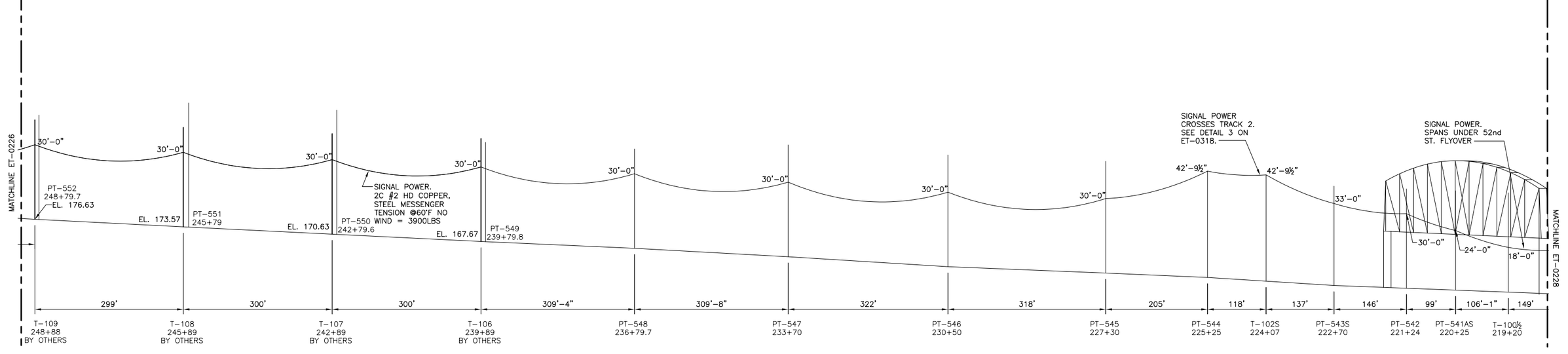
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File No.:	2011-059-ET-0226.DWG
Ref. No.:	2011-059
Sheet No:	057 OF 347

ET-0226



NORTH TRANSMISSION PROFILE



SOUTH TRANSMISSION PROFILE – PROPOSED 6900V SIGNAL POWER

SCALE:1"=20'-0"

SCALE:1"=100'-0"

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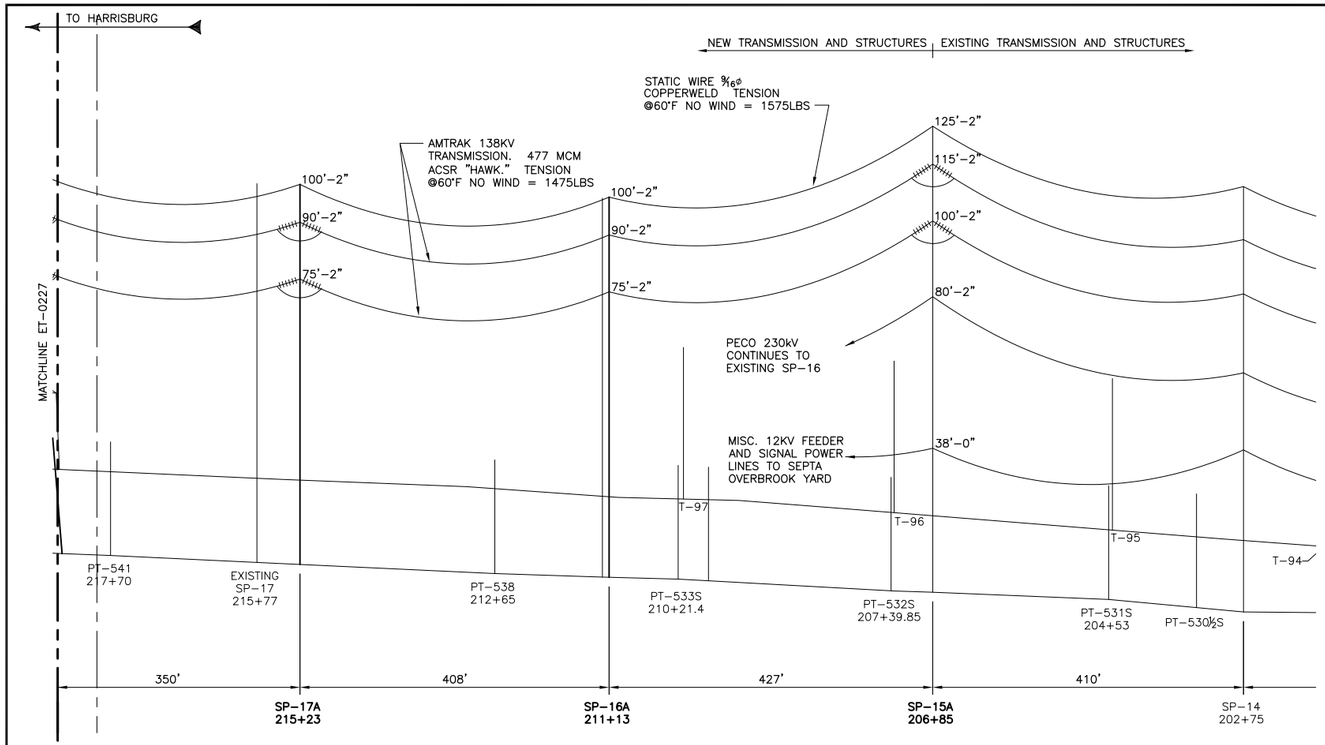
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

TRANSMISSION PROFILE STA 247+00 TO 216+32

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0227.DWG
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ET-0227



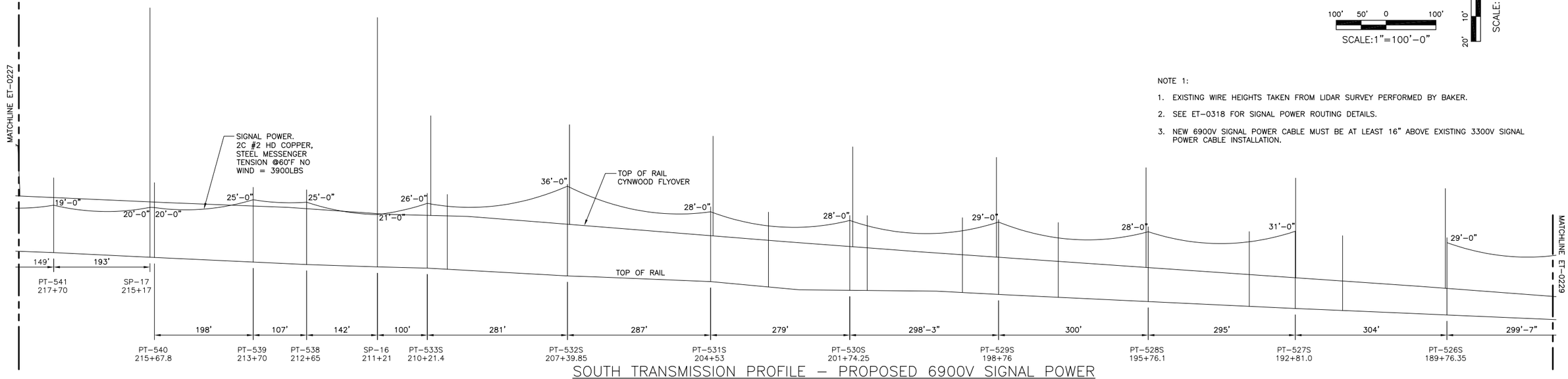
NORTH TRANSMISSION PROFILE

SCALE:1"=100'-0"

SCALE:1"=20'-0"

NOTE 1:

1. EXISTING WIRE HEIGHTS TAKEN FROM LIDAR SURVEY PERFORMED BY BAKER.
2. SEE ET-0318 FOR SIGNAL POWER ROUTING DETAILS.
3. NEW 6900V SIGNAL POWER CABLE MUST BE AT LEAST 16" ABOVE EXISTING 3300V SIGNAL POWER CABLE INSTALLATION.



SOUTH TRANSMISSION PROFILE – PROPOSED 6900V SIGNAL POWER

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TRANSMISSION PROFILE
STA 216+32 TO 181+55

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-0228.DWG
Ref. No.:	2011-059
Sheet No:	059 OF 347

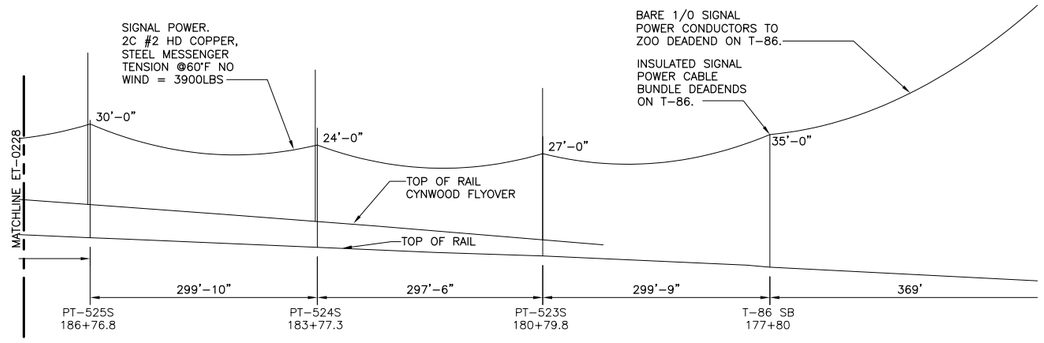
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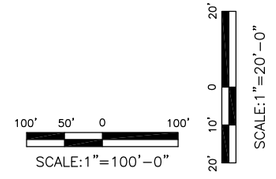
TO HARRISBURG

TO PHILADELPHIA

INSULATED SIGNAL POWER CONDUCTORS | (2) BARE ⅛ SIGNAL POWER CONDUCTORS



SOUTH TRANSMISSION PROFILE – PROPOSED 6900V SIGNAL POWER



NOTE 1:

1. EXISTING WIRE HEIGHTS TAKEN FROM LIDAR SURVEY PERFORMED BY BAKER.
2. SEE ET-0318 FOR SIGNAL POWER ROUTING DETAILS.
3. NEW 6900V SIGNAL POWER CABLE MUST BE AT LEAST 16" ABOVE EXISTING 3300V SIGNAL POWER CABLE INSTALLATION.

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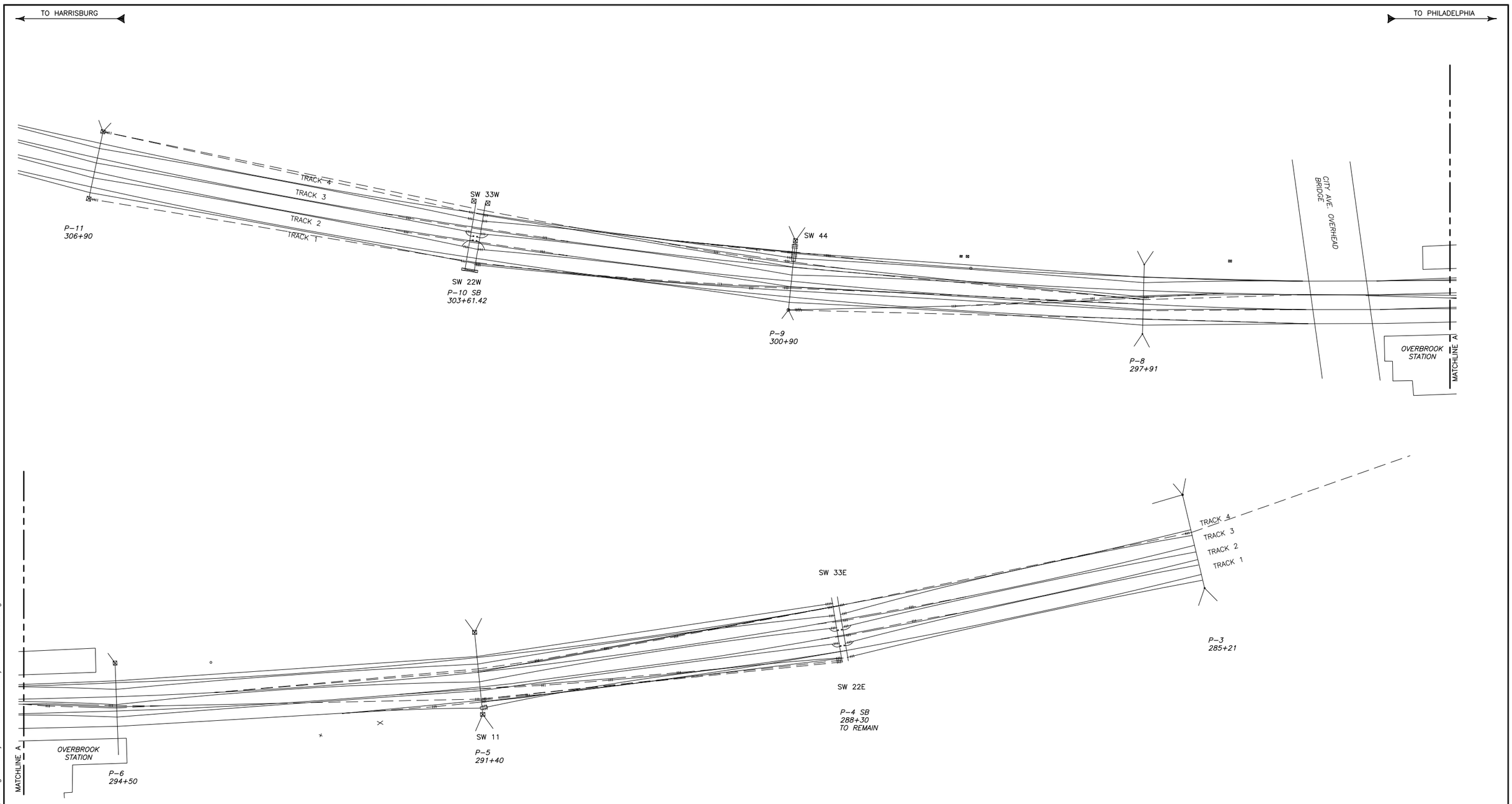
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TRANSMISSION PROFILE
STA 181+55 TO 177+80

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-0229.DWG
Ref. No.:	2011-059
Sheet No:	060 OF 347

ET-0229

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OVERBROOK INTERLOCKING EXISTING WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'–0"

NOTE:

1. OVERBROOK INTERLOCKING WILL BE REPLACED BY WYNNEFIELD INTERLOCKING.

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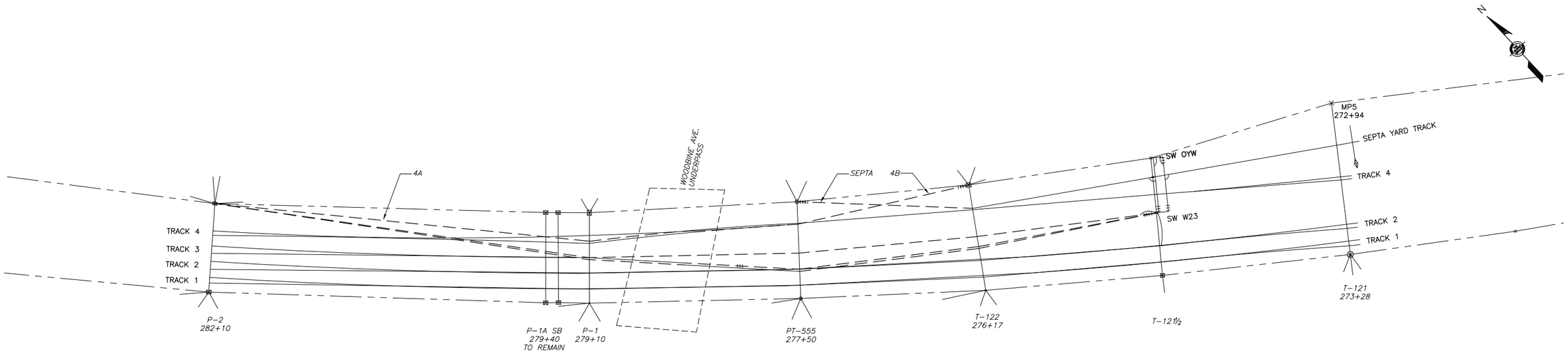
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
WIRE PLAN
OVERBROOK INTERLOCKING EXISTING WIRE PLAN

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0308.DWG
Ref. No.:	2011–059
Sheet No:	061 OF 347

ET–0308

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3/14/2016
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WOODBINE INTERLOCKING
EXISTING WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'–0"

NOTE:

1. WOODBINE INTERLOCKING WILL BE REPLACED BY WYNNEFIELD INTERLOCKING.

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ELECTRIFICATION
WIRE PLAN
WOODBINE INTERLOCKING EXISTING WIRE PLAN

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File No.:	2011-059-ET-0310.DWG
Ref. No.:	2011–059
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ET–0310

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TO HARRISBURG

TO PHILADELPHIA

N

SEE DRAWING ET-0320 FOR CONTINUATION

ST-39

AMTRAK 138kV TRANSMISSION TO BE REMOVED

PECO 220kV TRANSMISSION TO REMAIN

ST-38 221+10

ST-37

MATCHLINE SEE DRAWING ET-0313

PT-541 217+70

SP-17 215+77

BALA CYNWYD LINE UNDERPASS

TRACK 4

TRACK 2

52ND STREET BRIDGE

PT-544 225+25

PT-545 227+30

T-101M 221+24

T-100S 218+60

T-99 215+99

ST-101 213+18

40' 20' 0 40'

SCALE:1"=40'-0"

52nd STREET EXISTING TRANSMISSION WIRE PLAN SHEET 1

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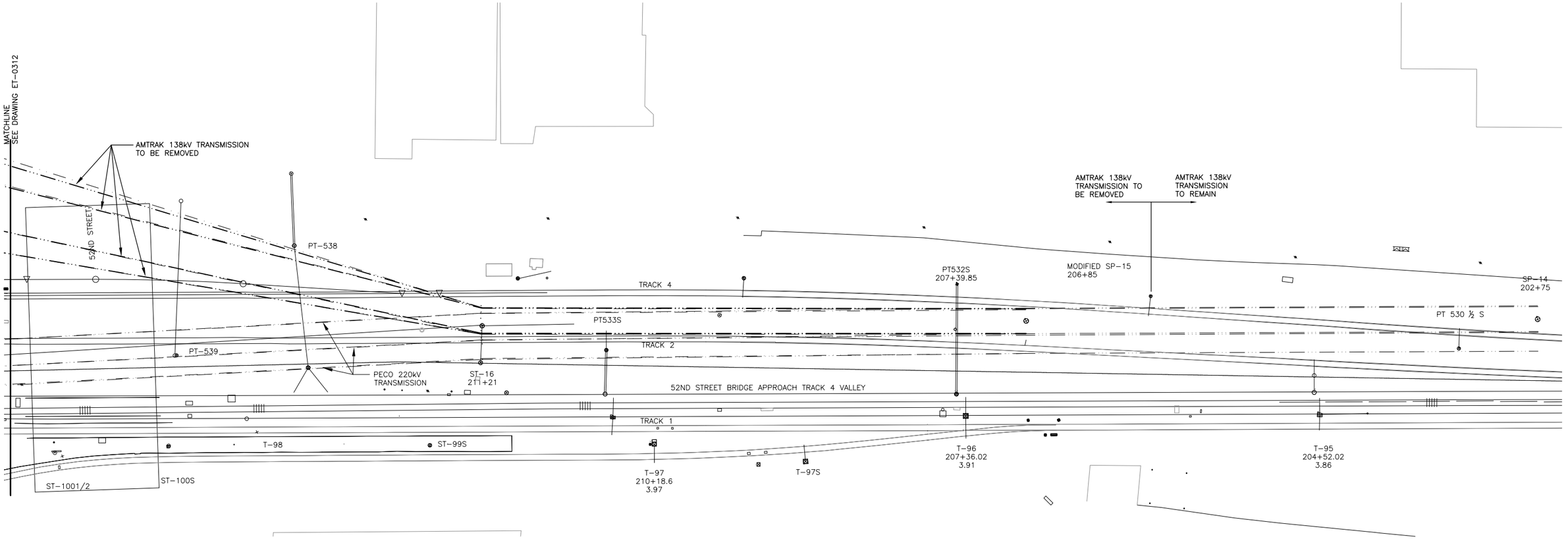
52ND STREET EXISTING TRANSMISSION WIRE PLAN SHEET 1 OF 2

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-0312.DWG
Ref. No.:	2011-059
Sheet No:	063 OF 347

ET-0312

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52nd STREET EXISTING TRANSMISSION WIRE PLAN SHEET 2

40' 20' 0 40'

SCALE:1"=40'-0"

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52ND STREET EXISTING TRANSMISSION WIRE PLAN
SHEET 2 OF 2

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0313.DWG
Ref. No.:	2011-059
Sheet No:	064 OF 347

ET-0313

TO HARRISBURG

TO PHILADELPHIA

N

ST–39

ST–38
221+10

ST–37

PECO 220kV TRANSMISSION

BALA CYNWYD LINE
UNDERPASS

NEW POLE SP–20A

TRACK 4

TRACK 2

TRACK 1

52ND STREET BRIDGE

PT–541
217+70

SP–17
215+77

PT–543S
222+70

PT–542
221+76

PT–541AS
220+25

T–100½
219+20

T–100S
218+60

PT–544
225+25

T–102S
224+07

T–101M
221+24

NEW POLE SP–19A

T–99
215+99

NEW POLE SP–17A

PT–545
227+30

SIGNAL POWER CROSSES
TRACKS 1 AND 2 ON PT–545.
SEE DETAIL #2 ON ET–0318
FOR ROUTING DETAIL.

NEW 6900V SIGNAL POWER
CROSSES TRACK 2. SEE
DETAIL #3 ON ET–0318 FOR
CROSSING PROFILE.

DOWN GUY

NEW POLE SP–18A

DOWN GUY

ST–101
213+18

MATCHLINE SEE
DRAWING ET–0315

52nd STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 1

40' 20' 0 40'

SCALE:1"=40'–0"

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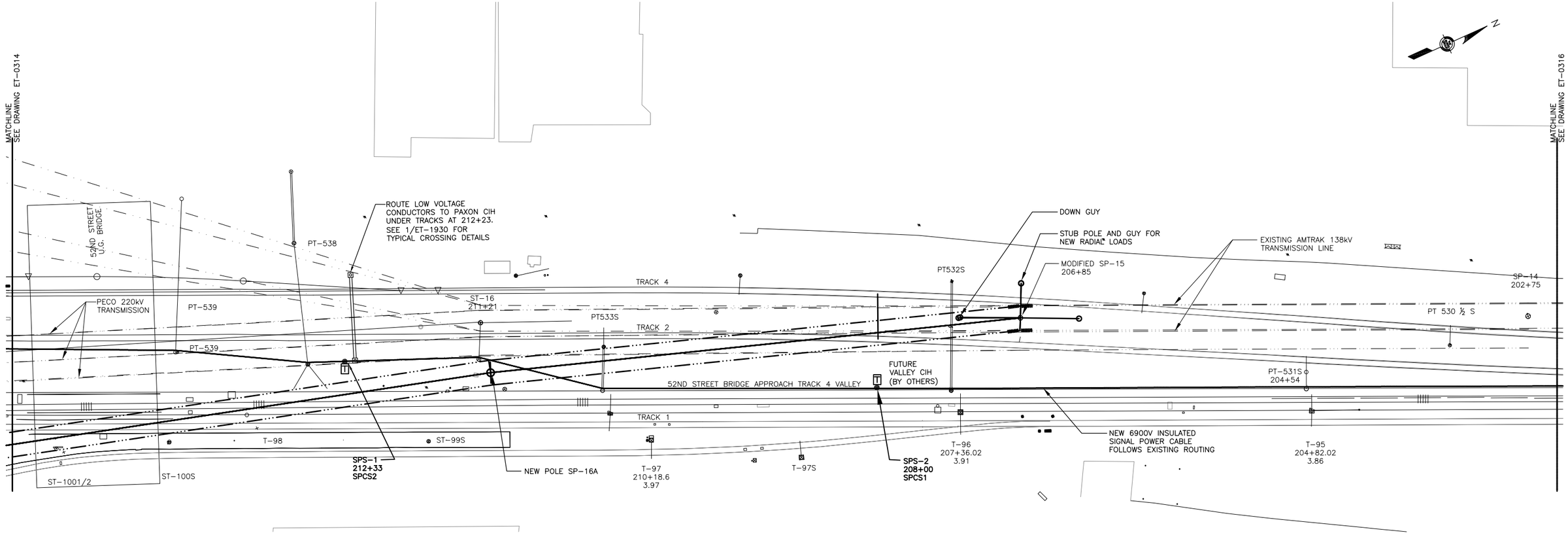
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
52ND STREET PROPOSED TRANSMISSION
AND SIGNAL POWER WIRE PLAN SHEET 1 OF 4

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-0314.DWG
Ref. No.:	2011-059
Sheet No:	065 OF 347

ET–0314

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52nd STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 2

40' 20' 0 40'

SCALE:1"=40'-0"

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ELECTRIFICATION
52ND STREET PROPOSED TRANSMISSION
AND SIGNAL POWER WIRE PLAN SHEET 2 OF 4

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File No.:	2011-059-ET-0315.DWG
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ET-0315

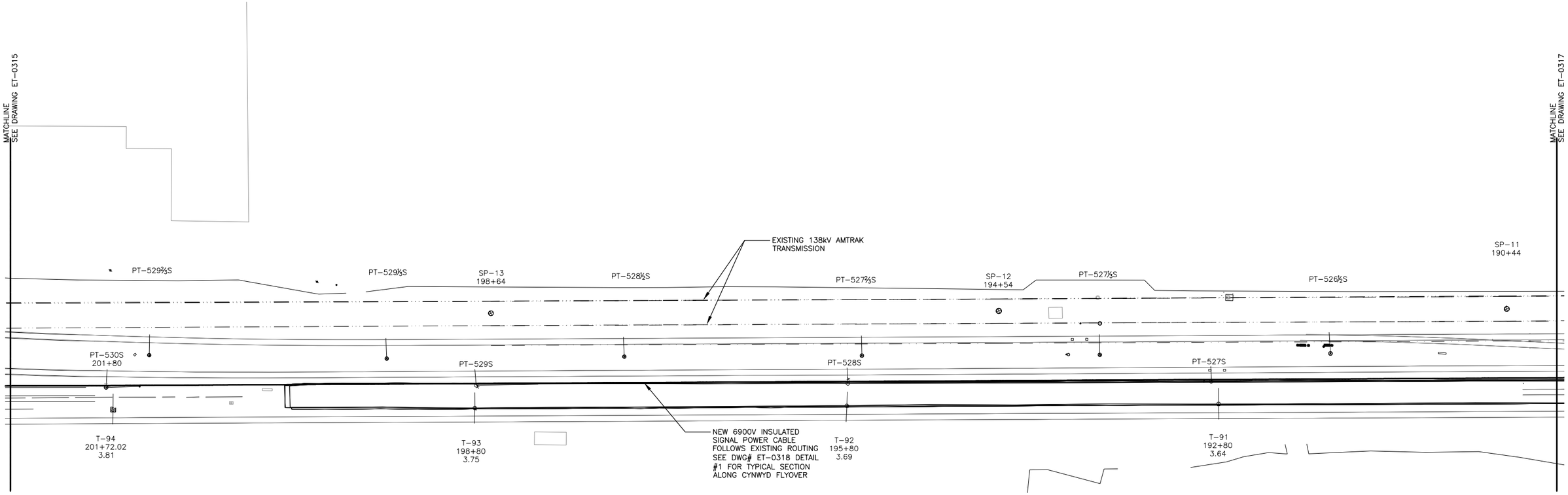
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TO HARRISBURG

TO PHILADELPHIA

MATCHLINE
SEE DRAWING ET-0315

MATCHLINE
SEE DRAWING ET-0317



52nd STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 3

40' 20' 0 40'

SCALE:1"=40'-0"

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52ND STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 3 OF 4

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Ref. No.:	2011-059
Sheet No:	067 OF 347

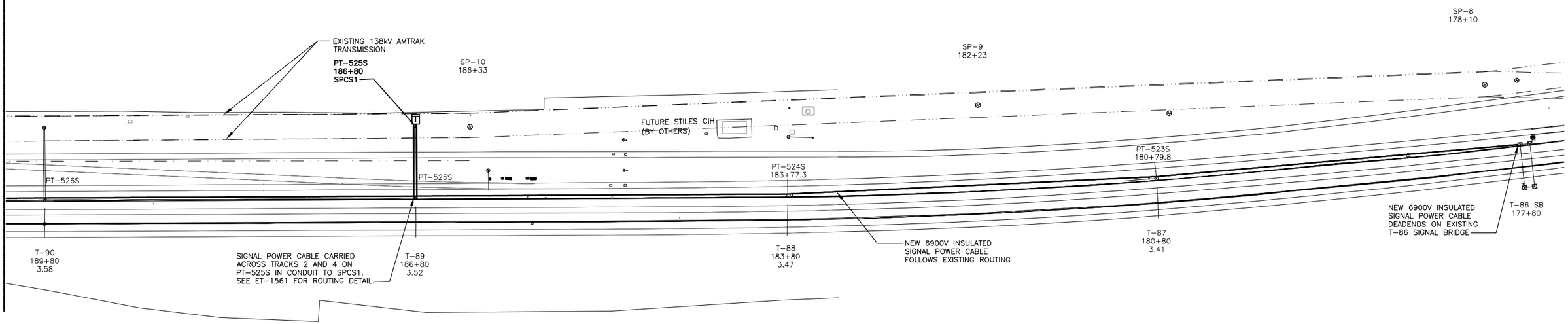
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TO HARRISBURG

TO PHILADELPHIA

MATCHLINE
SEE DRAWING ET-0316



52nd STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 4

40' 20' 0 40'

SCALE:1"=40'-0"

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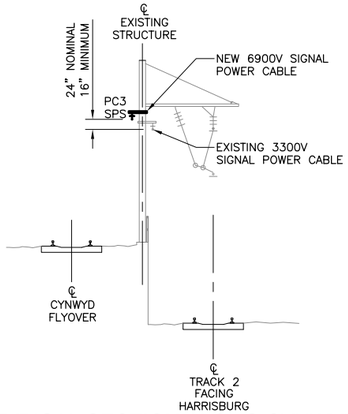
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
52ND STREET PROPOSED TRANSMISSION AND SIGNAL POWER WIRE PLAN SHEET 4 OF 4

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

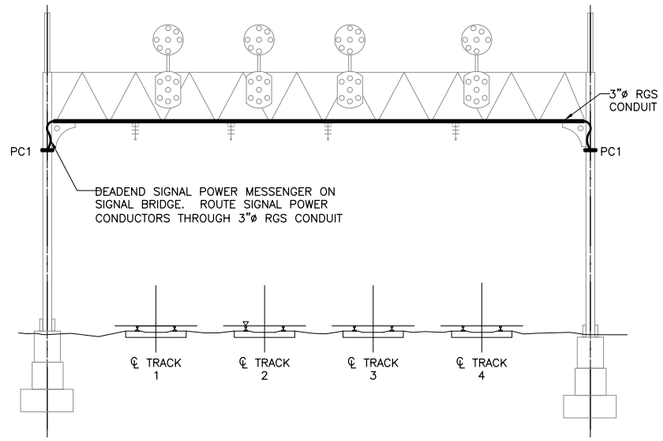
File No.:	2011-059-ET-0317.DWG
Ref. No.:	2011-059
Sheet No:	068 OF 347

ET-0317

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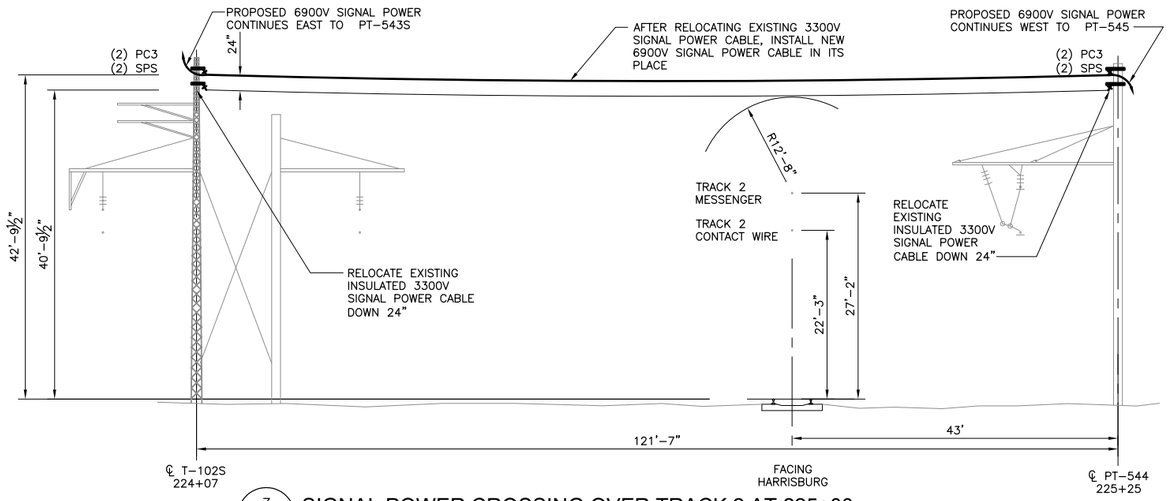
1 / ... TYPICAL SECTION ALONG CYNWYD FLYOVER
1" = 10'-0"



2 / ... SIGNAL POWER ROUTING OVER SIGNAL BRIDGE
1" = 10'-0"

SCHEDULE OF POLES – OVERBROOK YARD TO GIRARD AVE.			
STRUCTURE	STATION	POLE TYPE	BRACKET REQ'D
PT–548	236+79.7	W–SECTION	PC–3
PT–547	233+70	W–SECTION	PC–3
PT–546	230+50	W–SECTION	PC–3
PT–545	227+30	SIGNAL BRIDGE	PC–1
PT–544	225+25	W–SECTION	PC–3
T–102S	224+07	W–SECTION	PC–3
PT–543S	222+70	W–SECTION	PC–3
PT–542	221+76	W–SECTION	PC–3
PT–541AS	220+25	W–SECTION	PC–3
T–100½	219+20	W–SECTION	PC–3
PT–541	217+70	W–SECTION	PC–3
SP–17	215+77	W–SECTION	PC–3
PT–540	215+67.8	W–SECTION	PC–3
PT–539	213+70	W–SECTION	PC–3
PT–538	212+65	W–SECTION	PC–3
SPS–1 (NEW)	212+33	W–SECTION	SEE ET–1559
SP–16	211+21	W–SECTION	PC–3
PT–533S	210+21.4	W–SECTION	PC–3
SPS–2 (NEW)	208+00	W–SECTION	SEE ET–1560
PT–531S	204+53	W–SECTION	PC–3
PT–530S	201+74.25	W–SECTION	PC–3
PT–529S	198+76	W–SECTION	PC–3
PT–528S	195+76.1	W–SECTION	PC–3
PT–527S	192+81.0	W–SECTION	PC–3
PT–526S	189+76.35	W–SECTION	PC–3
PT–525S	186+80	W–SECTION	PC–3
PT–524S	183+77.3	W–SECTION	PC–3
PT–523S	180+79.8	W–SECTION	PC–3
T–86 SIG BRIDGE	177+80	SIGNAL BRIDGE	PC–1

BILL OF MATERIAL OVERBROOK YARD TO GIRARD AVE.		
ITEM	QTY	UNIT
PC3	26	EA
PC1	2	EA
SPS	26	EA
SPT	2	EA
2C #2 AWG INSULATED CABLE WITH ⅜" MESSENGER	6050	LF



3 / ... SIGNAL POWER CROSSING OVER TRACK 2 AT 225+00
1" = 10'-0"

NOTES:

1. SEE DWG# S–5215 FOR POLE CLAMP (PC–3) DETAILS.
2. SEE DWG# ET–1913 FOR SIGNAL POWER SUPPORT (SPS) DETAILS.

0 10 20
SCALE: 1"=10'–0"

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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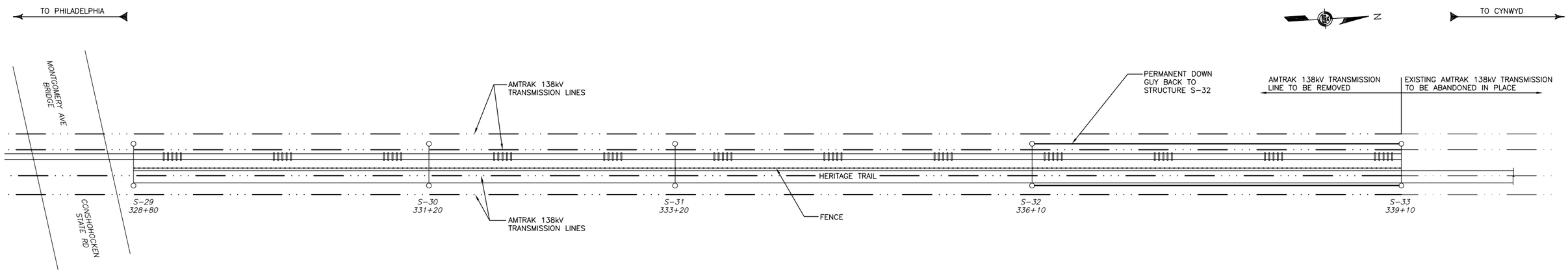
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
WIRE PLAN
INSULATED 6900V SIGNAL POWER ROUTING DETAILS

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–0318.DWG
Ref. No.:	2011–059
Sheet No:	069 OF 347

ET–0318

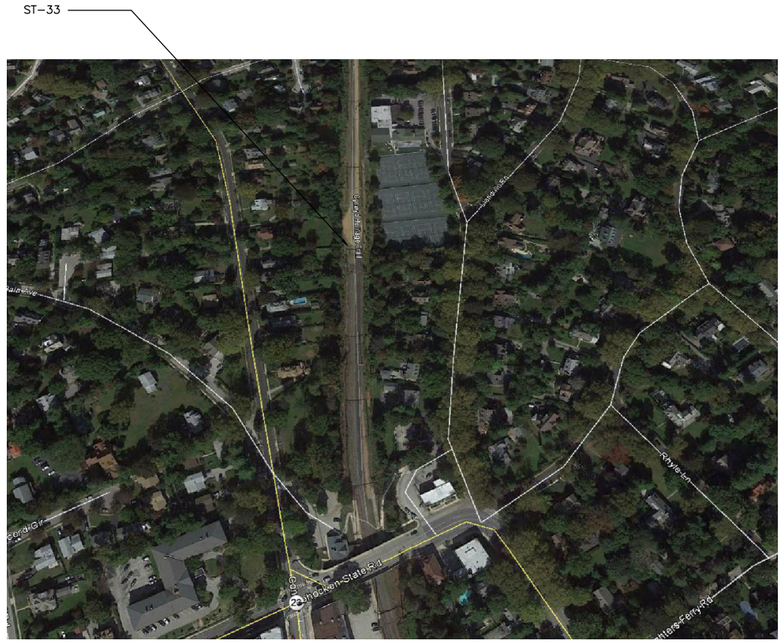
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CYNWYD WIRE PLAN

40' 20' 0 40'

SCALE:1"=40'-0"



CYNWYD LOCATION MAP

WORK STATEMENT:

1. INSTALL PERMANENT DOWN GUYS.
2. DEAD END EXISTING TRANSMISSION CONDUCTORS ON STRUCTURE S-33.
3. REMOVE EXISTING 138kV TRANSMISSION LINES FROM STRUCTURE S-33 BACK TO STRUCTURE SP-15. SEE DRAWINGS ET-0312 TO ET-0315 TO VIEW LIMITS OF WIRE REMOVAL NEAR 52ND STREET BRIDGE..

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CYNWOOD PROPOSED TRANSMISSION TERMINATION LOCATION

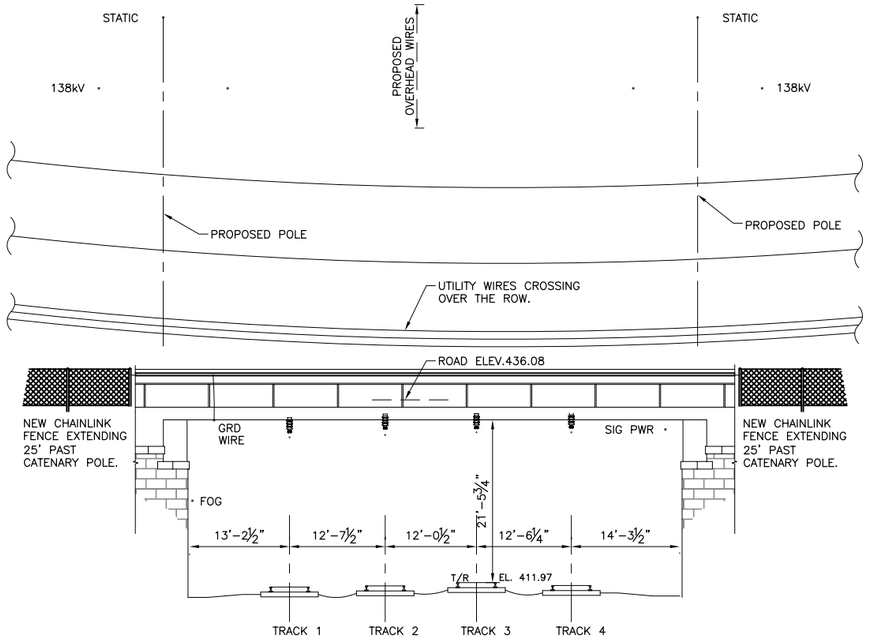
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-0320.DWG
Ref. No.:	2011-059
Sheet No:	070 OF 347

ET-0320

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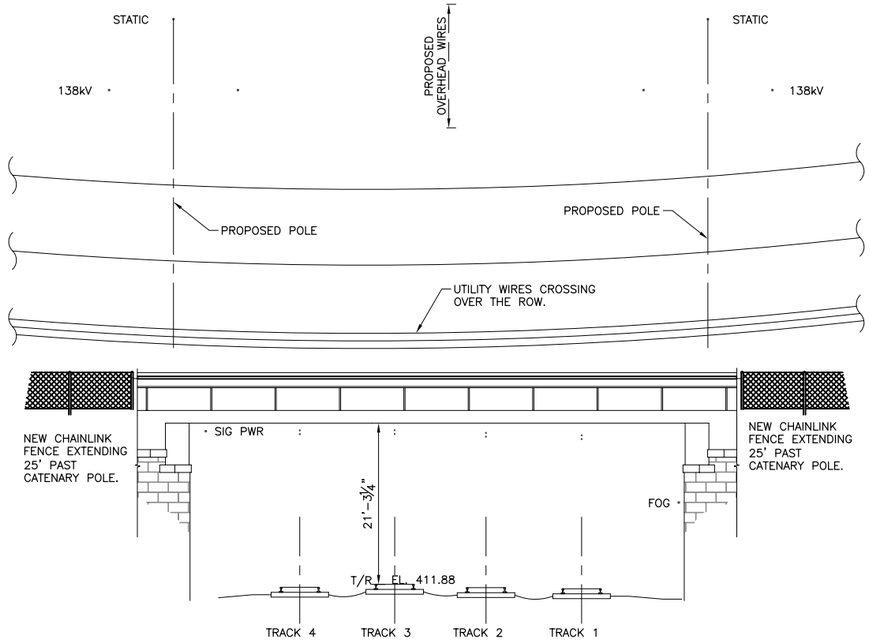
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	2



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

PENNSWOOD ROAD BRIDGE

523+48
MP 9.81

WORK STATEMENT:

1. INSTALL CHAINLINK FENCES. BOND FENCES TO PEDESTRIAN BARRIER AND STATIC WIRE.
2. INSTALL ALUMINUM BARS ACROSS THE TOP OF THE PEDESTRIAN BARRIERS AND BOND TO STATIC WIRE.

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' WORST CASE.

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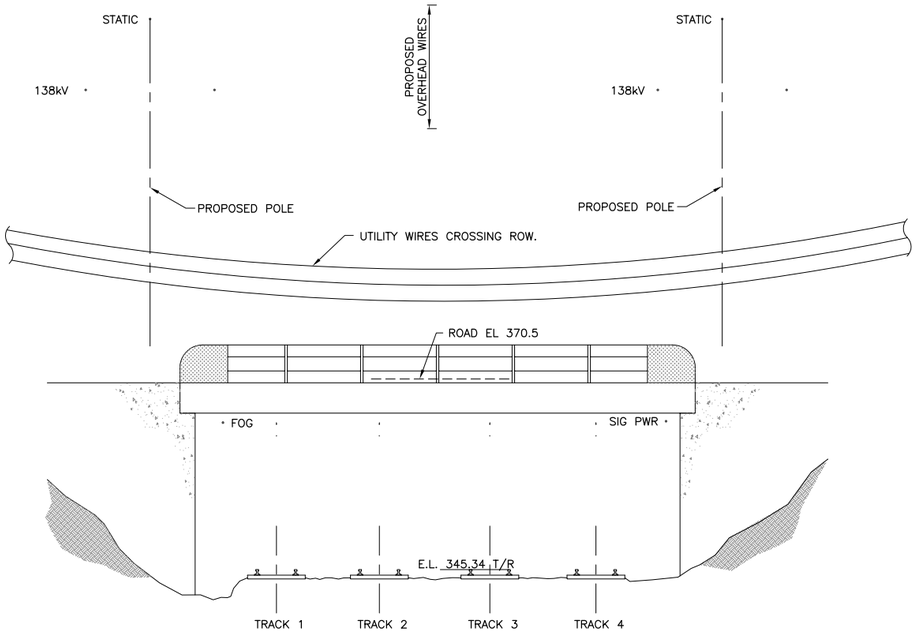
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
OVERHEAD BRIDGES
PENNSWOOD ROAD BRIDGE, EAST WEST ELEVATION

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1007.DWG
Ref. No.:	2011-059
Sheet No:	071 OF 347

ET-1007

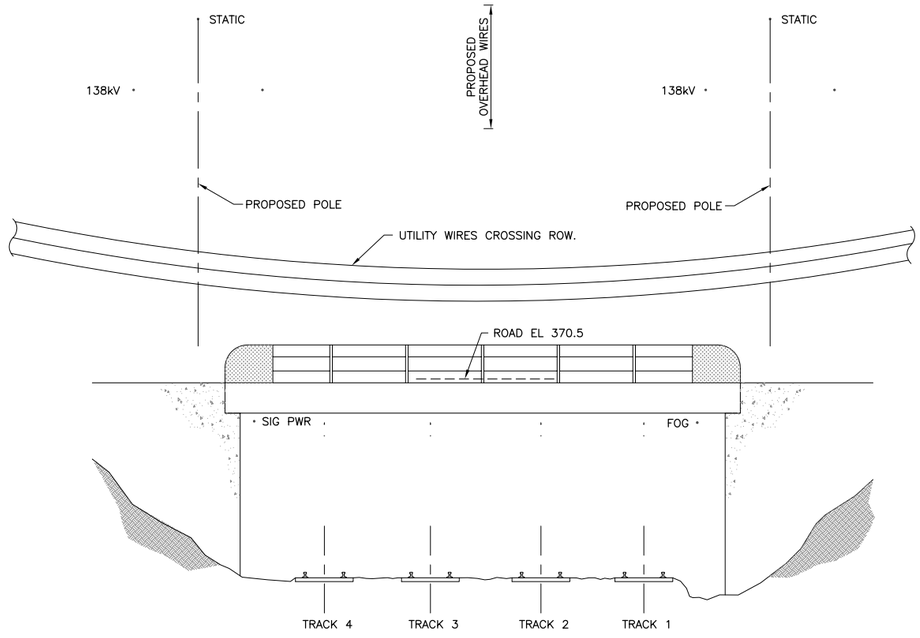
3/14/2016 4:15:45 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\oh bridges\2011-059-ET-1007.dwg



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

CHURCH ROAD BRIDGE

437+39
MP 8.18

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' WORST CASE.

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ELECTRIFICATION
OVERHEAD BRIDGES
CHURCH ROAD BRIDGE, EAST WEST ELEVATION

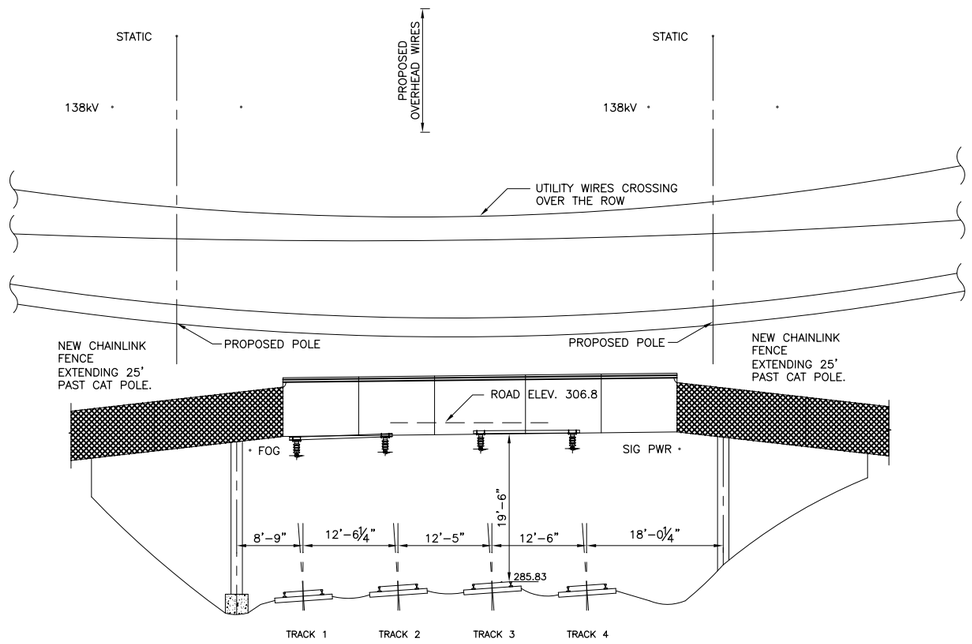
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1008.DWG
Ref. No.:	2011-059
Sheet No:	072 OF 347

ET-1008

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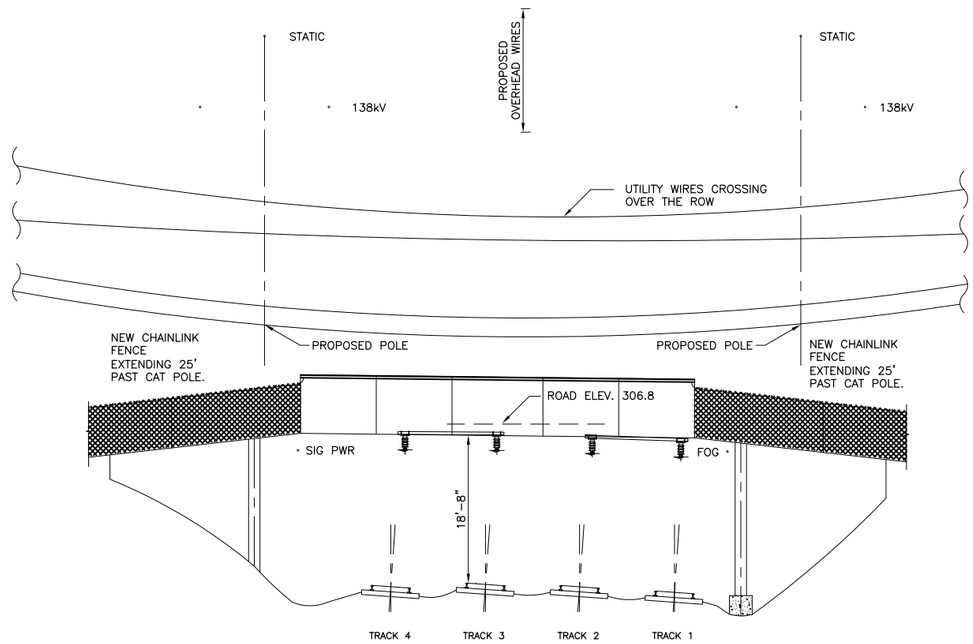
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
BBGD	BRIDGE BARRIER GROUNDING DETAIL WITH CHAIN LINK FENCE	ET-1917	2



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

NARBERTH AVENUE BRIDGE

362+91
MP 6.77

WORK STATEMENT:

1. INSTALL CHAINLINK FENCES. BOND FENCES TO PEDESTRIAN BARRIER AND STATIC WIRE.
2. INSTALL ALUMINUM BARS ACROSS THE TOP OF THE PEDESTRIAN BARRIERS AND BOND TO STATIC WIRE.

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' WORST CASE.

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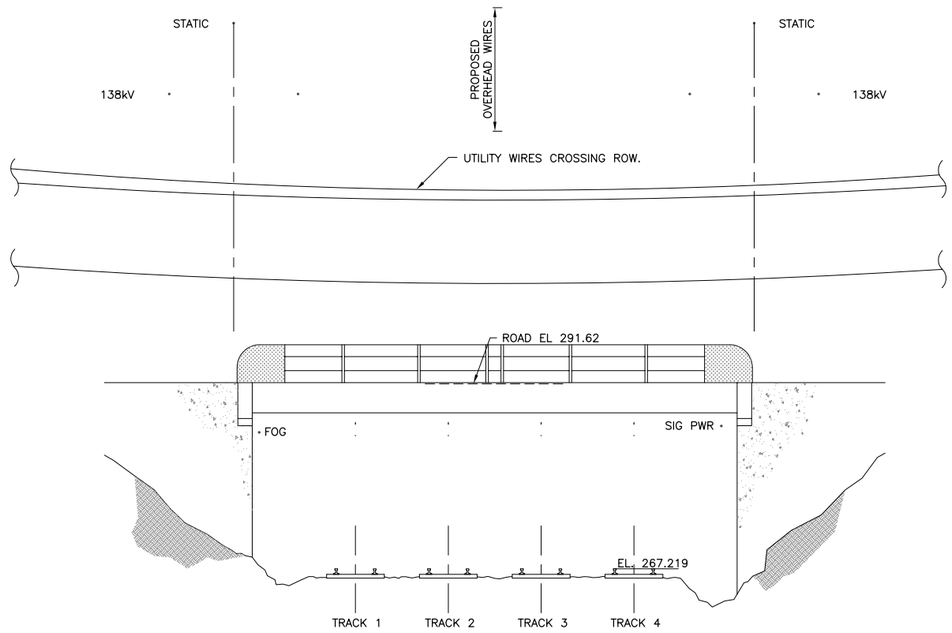
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
OVERHEAD BRIDGES
NARBERTH AVENUE BRIDGE, EAST WEST ELEVATION

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1009.DWG
Ref. No.:	2011-059
Sheet No:	073 OF 347

ET-1009

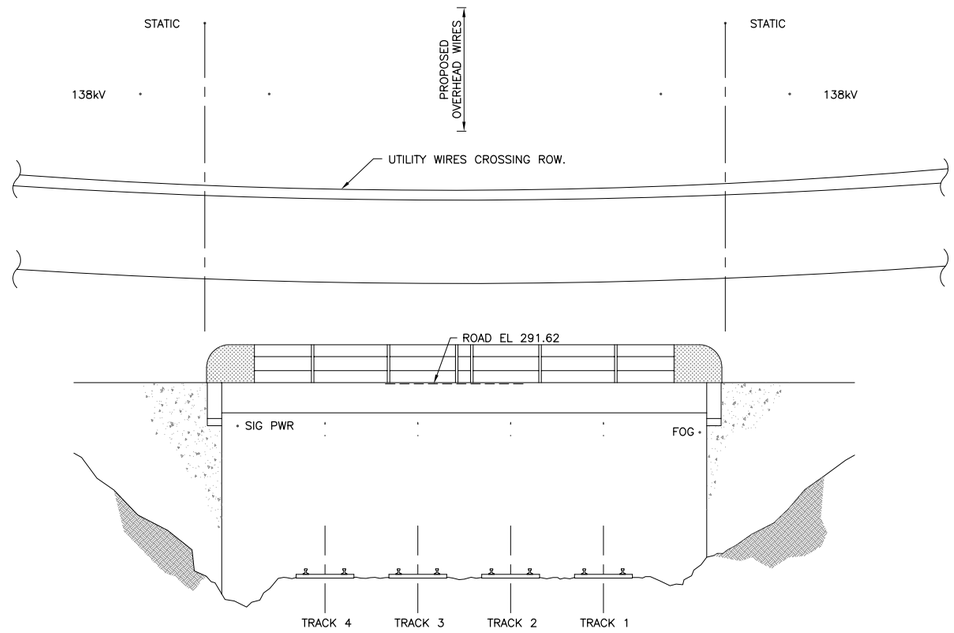
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LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

N. BOWMAN AVENUE BRIDGE

342+42
MP 6.38

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.
2. CLEARANCE OF 138kV OVER OTHER WIRES SHALL BE 10' WORST CASE.

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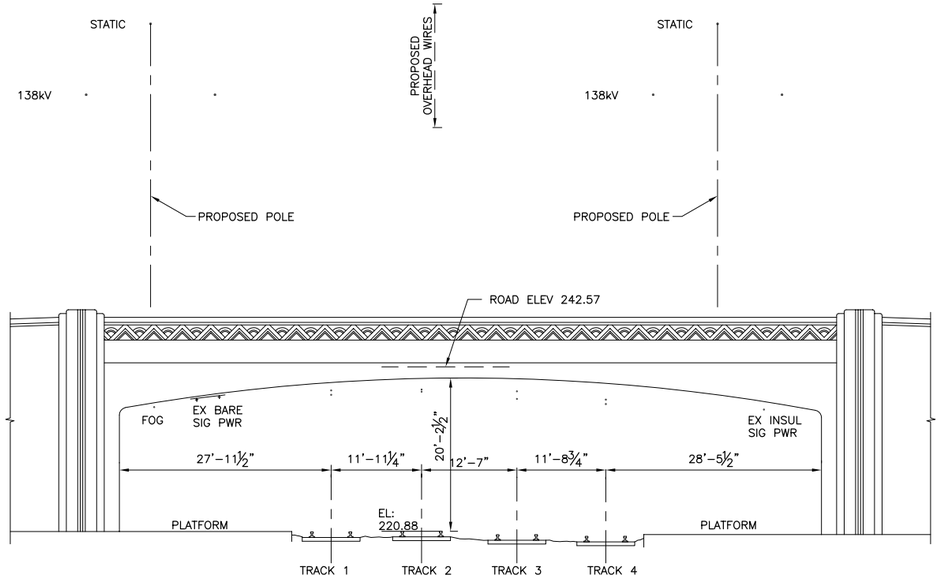
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
OVERHEAD BRIDGES
N. BOWMAN AVENUE BRIDGE, EAST WEST ELEVATION

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1011.DWG
Ref. No.:	2011-059
Sheet No:	074 OF 347

ET-1011

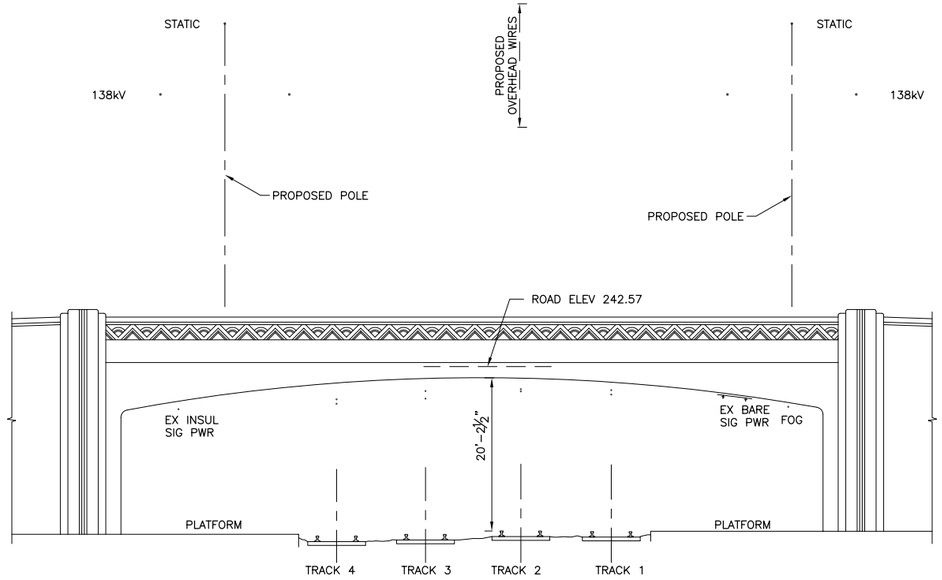
3/14/2016 4:16:04 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\oh bridges\2011-059-ET-1011.dwg



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

CITY AVENUE BRIDGE

296+31
MP 4.52

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.

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OVERHEAD BRIDGES

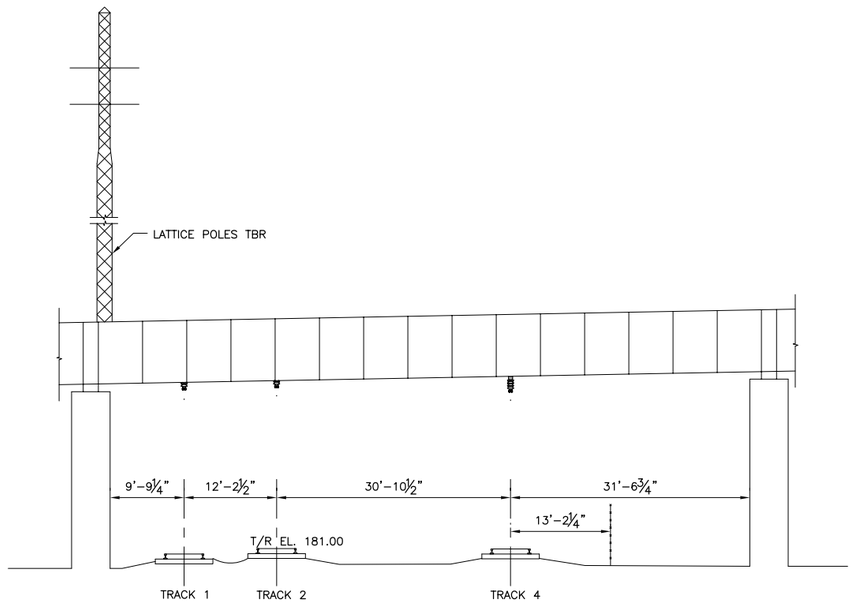
CITY AVENUE BRIDGE, EAST WEST ELEVATION

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1012.DWG
Ref. No.:	2011-059
Sheet No:	075 OF 347

ET-1012

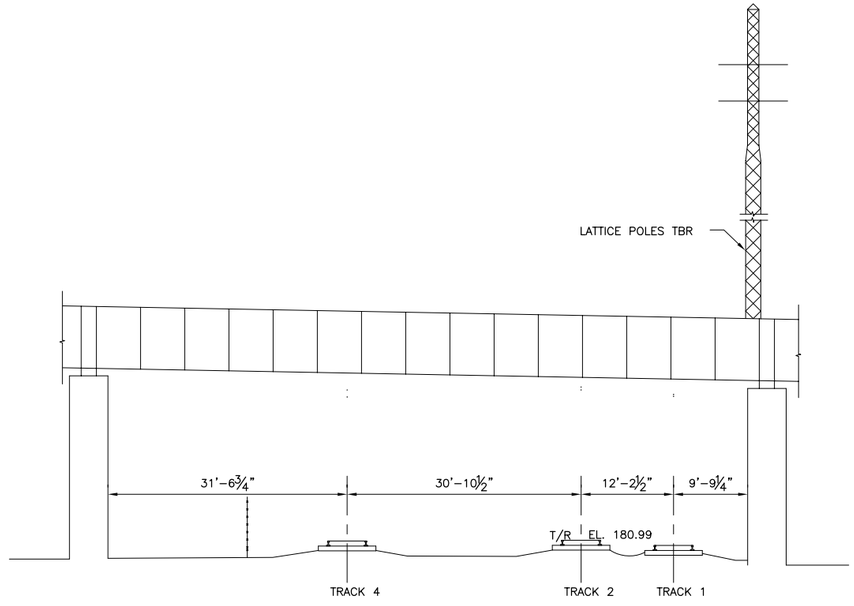
3/14/2016 4:16:10 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\oh bridges\2011-059-ET-1012.dwg



LOOKING WEST

10' 5' 0 10'

SCALE:1"=10'-0"



LOOKING EAST

10' 5' 0 10'

SCALE:1"=10'-0"

59TH STREET BRIDGE

252+83
MP 4.77

CLEARANCE NOTES:

1. CLEARANCE OF 138kV OVER ROADWAY SHALL BE 35' WORST CASE.

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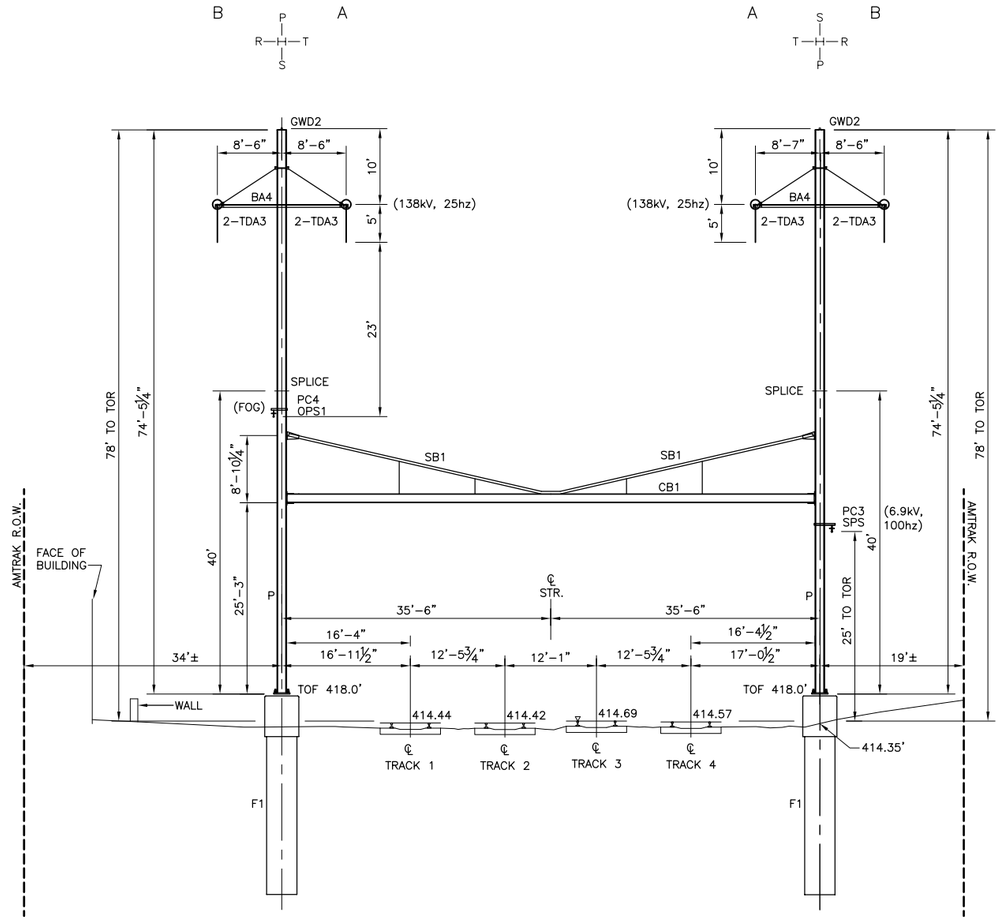
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
OVERHEAD BRIDGES
59TH STREET BRIDGE, EAST WEST ELEVATION

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1013.DWG
Ref. No.:	2011-059
Sheet No:	076 OF 347

ET-1013

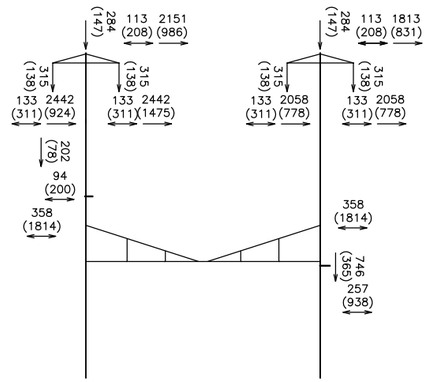
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STRUCTURE ERECTION DIAGRAM T-234

535+70
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
210' LOAD SPAN TRANSMISSION, SIGNAL POWER, STATIC
160' LOAD SPAN FOG AND CATENARY
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET -DOUBLE	S-5203	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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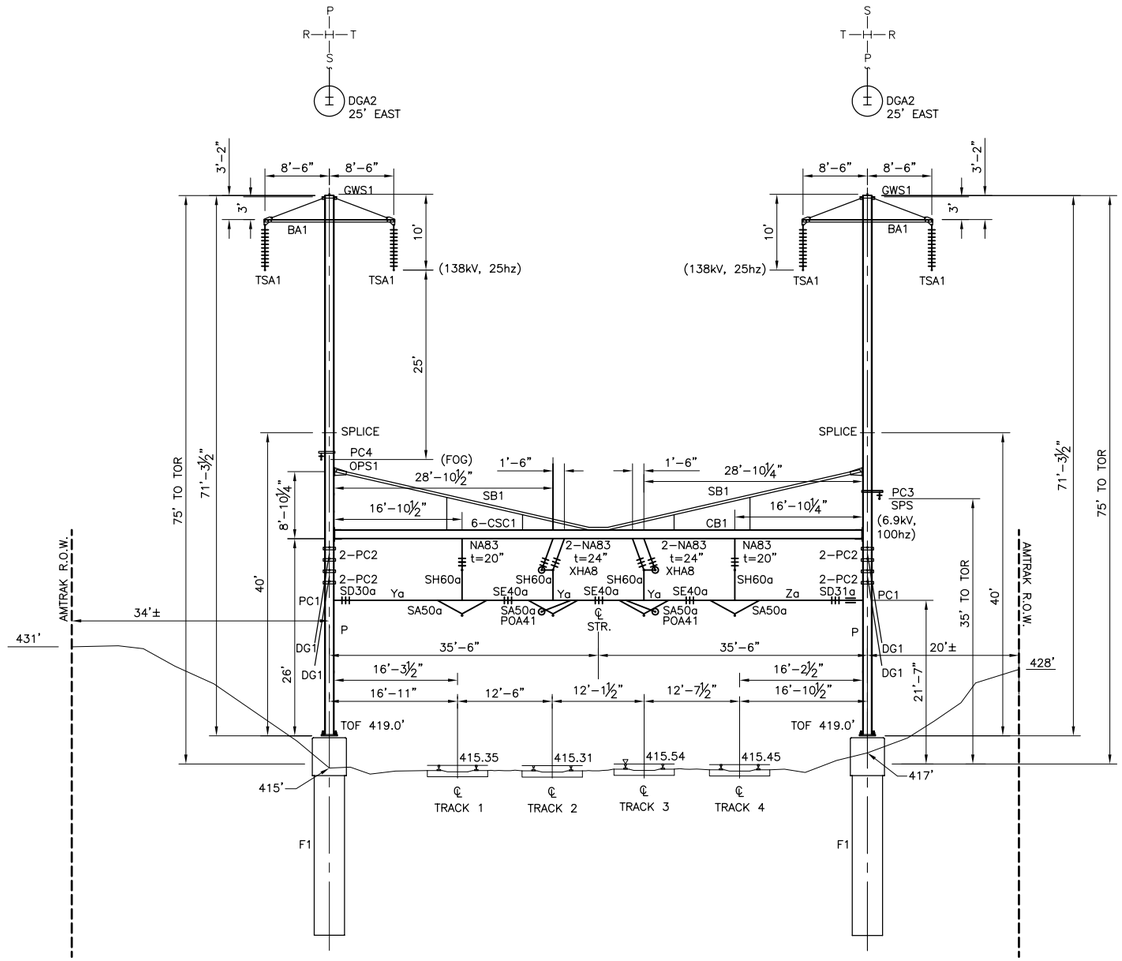
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-234

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1422.DWG
Ref. No.:	2011-059
Sheet No:	077 OF 347

ET-1422

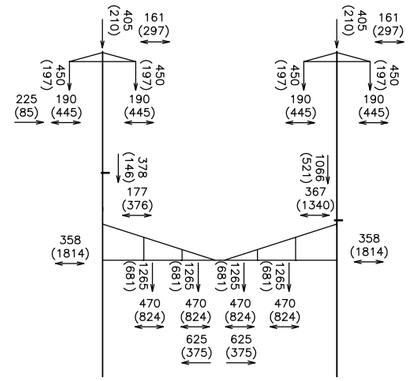
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STRUCTURE ERECTION DIAGRAM T-233

533+43
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	6
SD30a	STEADY SPAN ASSEMBLY	ET-1914	1
SD31a	STEADY SPAN ASSEMBLY	ET-1914	1
SE40a	STEADY SPAN ASSEMBLY	ET-1914	3
Ya	STEADY SPAN ASSEMBLY	ET-1914	3
Za	STEADY SPAN ASSEMBLY	ET-1914	1
SH60a	STEADY SPAN HANGER	ET-1914	4
SA50a	REGISTRATION ASSEMBLY	ET-1914	4
POA41	REGISTRATION ASSEMBLY	ET-1914	2
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
DG1	DOWNGUY	ET-1908	4
PC1	SLIDING CLAMP	S-5214	2
PC2	SLIDING CLAMP	S-5214	8
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING CLAMP	S-5214	12
DGA2	DOWNGUY ANCHOR	S-5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. BRYN MAWR INTERLOCKING WILL BE RETIRED ONCE VILLA AND NOVA INTERLOCKINGS ARE BUILT.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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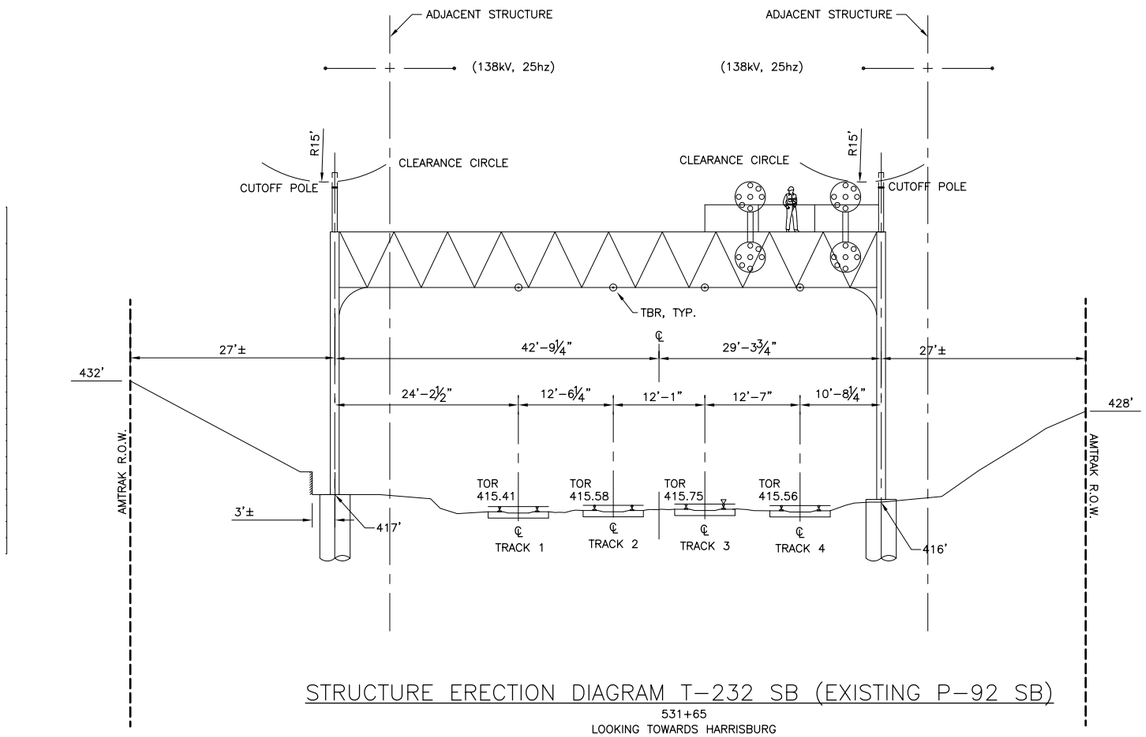
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-233

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1423.DWG
Ref. No.:	2011-059
Sheet No:	078 OF 347

ET-1423

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STRUCTURE ERECTION DIAGRAM T-232 SB (EXISTING P-92 SB)

531+65
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. GROUND STRUCTURE.
2. CUT OFF POLES.
3. REMOVE CATENARY SUPPORTS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-232 SB (P-92 SB)

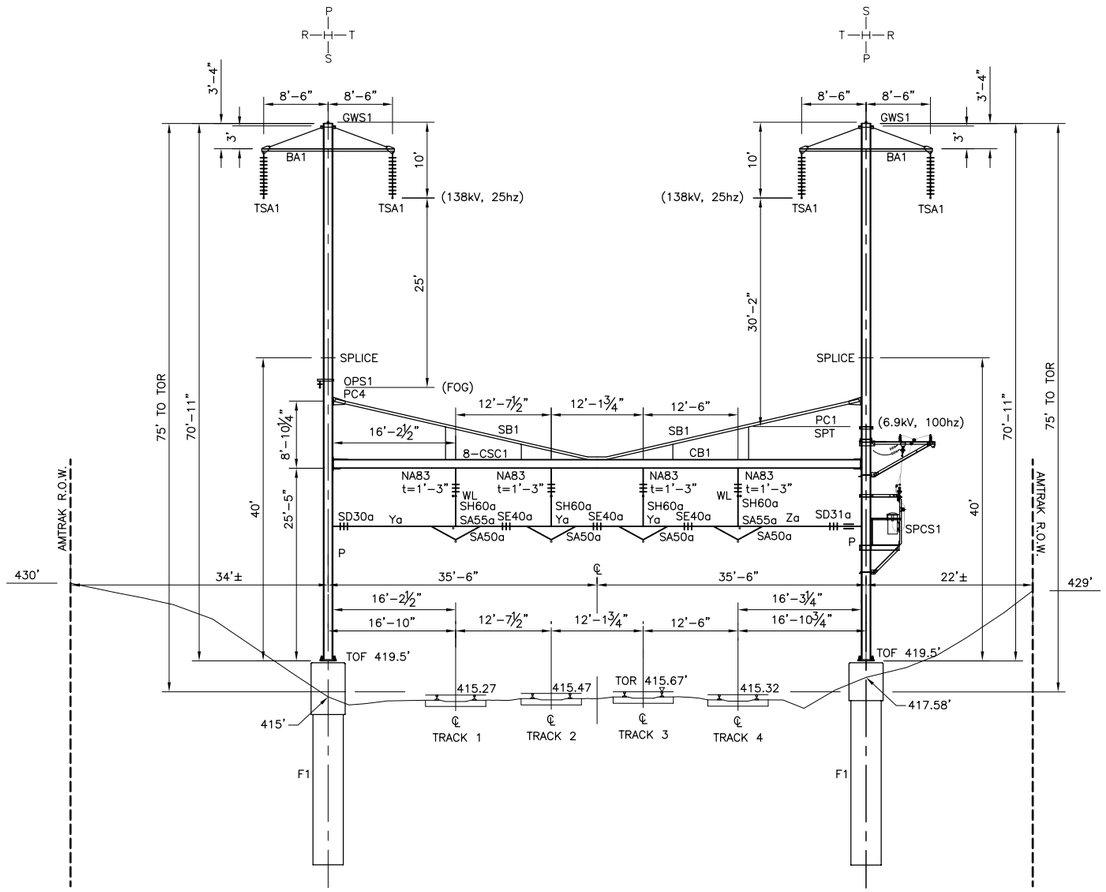
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1424.DWG
Ref. No.:	2011-059
Sheet No:	079 OF 347

ET-1424

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CATENARY WIRE HEIGHTS						
	TRACK 1	W/R 2B	TRACK 2	TRACK 3	W/R 3B	TRACK 4
MW	26'-3"	26'-3"	26'-0¾"	25'-10"	26'-2¾"	26'-2¾"
CW	20'-3"	21'-9"	20'-0¾"	19'-10"	21'-8¾"	20'-2¾"



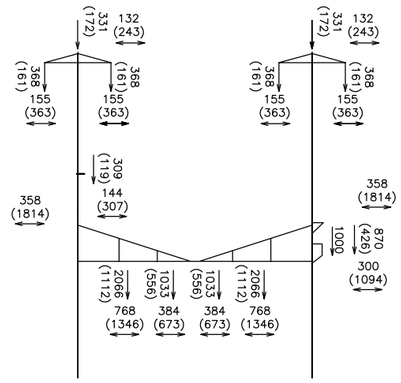
STRUCTURE ERECTION DIAGRAM T-231

530+61

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
245' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
SD30a	STEADY SPAN ASSEMBLY	ET-1914	1
SD31a	STEADY SPAN ASSEMBLY	ET-1914	1
SE40a	STEADY SPAN ASSEMBLY	ET-1914	3
Ya	STEADY SPAN ASSEMBLY	ET-1914	3
Za	STEADY SPAN ASSEMBLY	ET-1914	1
SH60a	STEADY SPAN HANGER	ET-1914	4
SA50a	REGISTRATION ASSEMBLY	ET-1914	4
POA41	PULL OFF ASSEMBLY	ET-1914	2
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPT	SIGNAL POWER TRANSFORMER	ET-1913	1
WL	WIRE LOCKS	ET-1915	8
SPCS1	SIGNAL POWER CUT SECTION	ET-1810	1
PC1	SLIDING CLAMP	S-5214	3
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING CLAMP	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. BRYN MAWR INTERLOCKING WILL BE RETIRED ONCE VILLA AND NOVA INTERLOCKINGS ARE BUILT.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-231

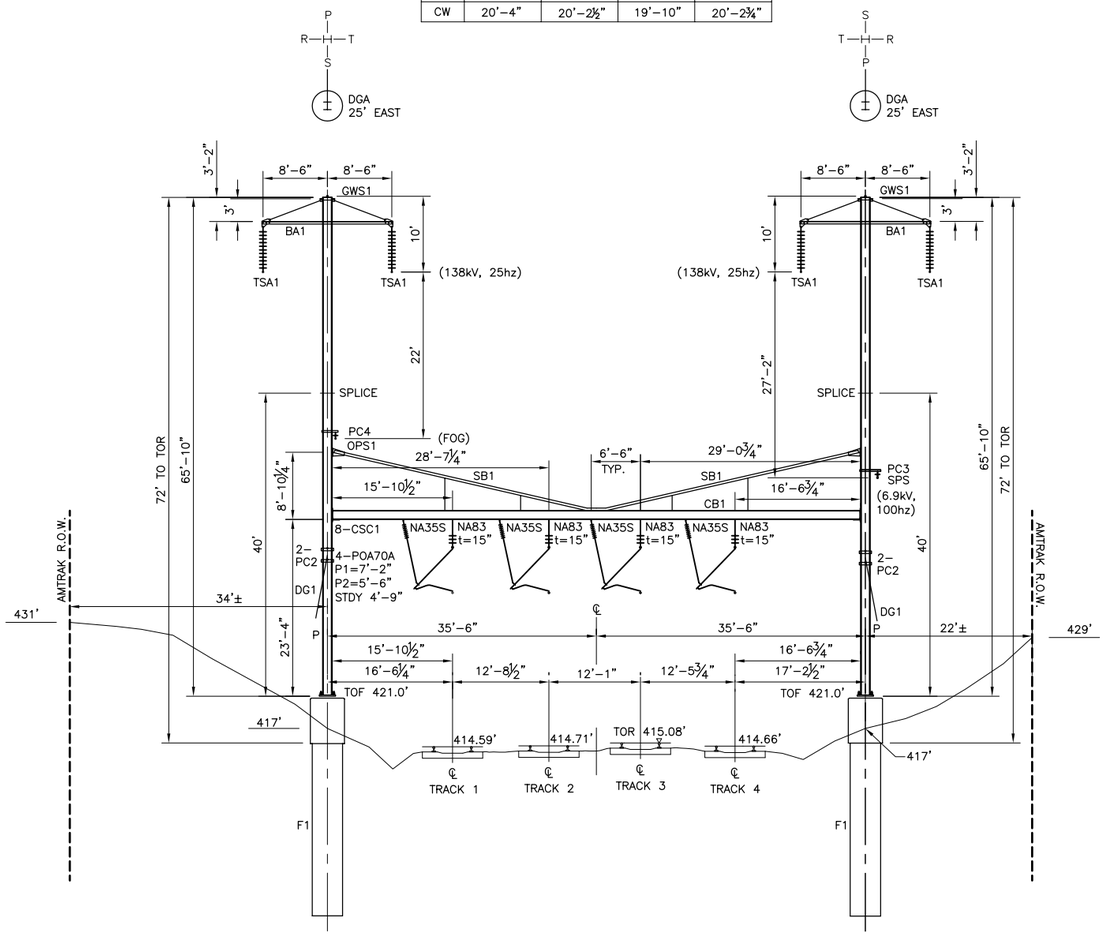
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1425.DWG
Ref. No.:	2011-059
Sheet No:	080 OF 347

ET-1425

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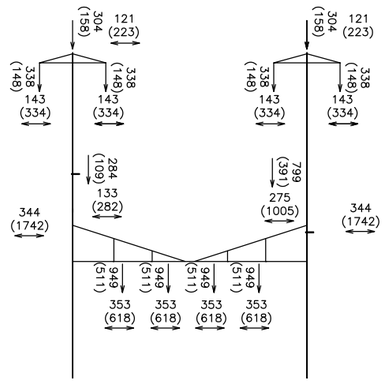
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4"	26'–2½"	25'–10"	26'–2¾"
CW	20'–4"	20'–2½"	19'–10"	20'–2¾"



STRUCTURE ERECTION DIAGRAM T–230

528+54
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
225' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWNGUY	ET–1908	2
PC2	SLIDING CLAMP	S–5214	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING CLAMP	S–5214	8
DGA	DOWNGUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–230

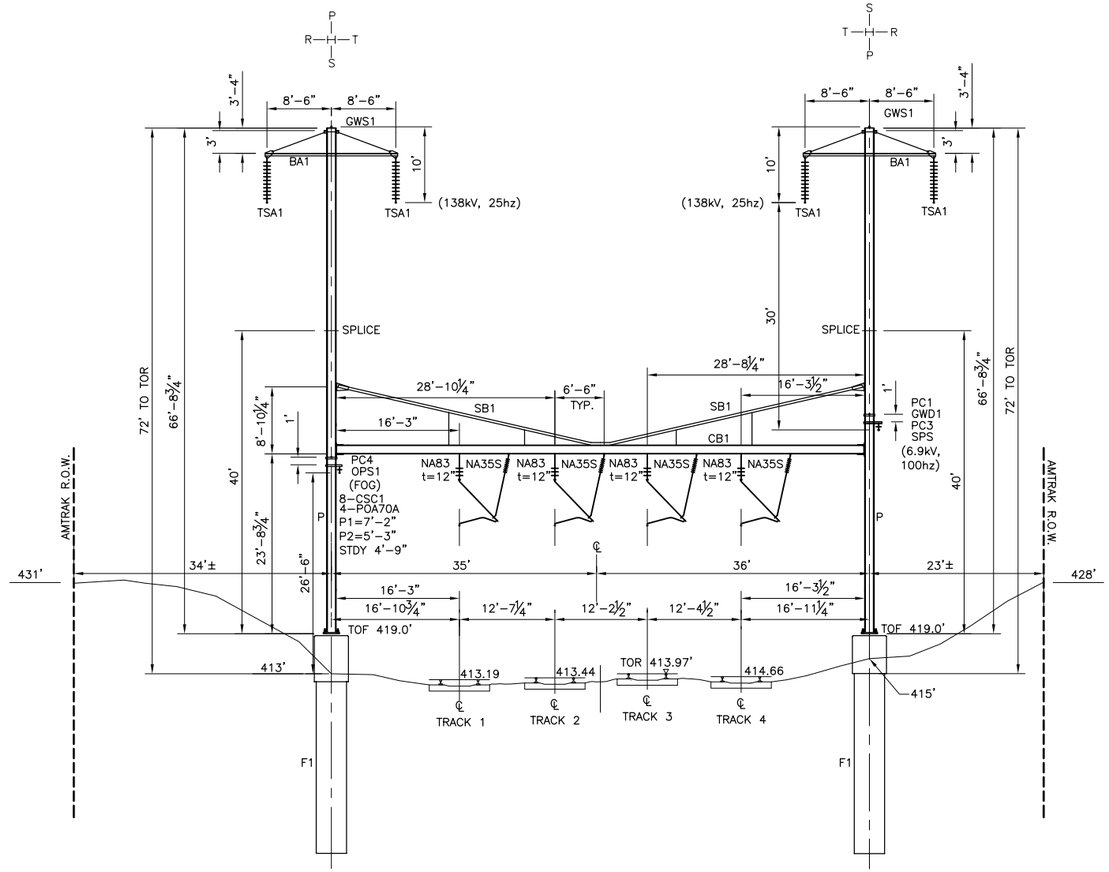
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File No.:	2011–059–ET–1426.DWG
Ref. No.:	2011–059
Sheet No:	081 OF 347

ET–1426

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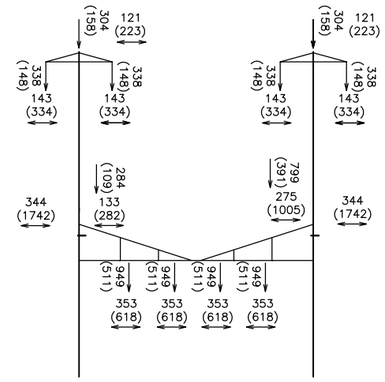
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-4¼"	26'-1¼"	25'-7"	24'-11¾"
CW	20'-4¼"	20'-1¼"	19'-7"	19'-11¾"



STRUCTURE ERECTION DIAGRAM T-229

526+13
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
225' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
GWD1	GROUND WIRE DEADEND	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC1	SLIDING CLAMP	S-5214	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING CLAMP	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-229

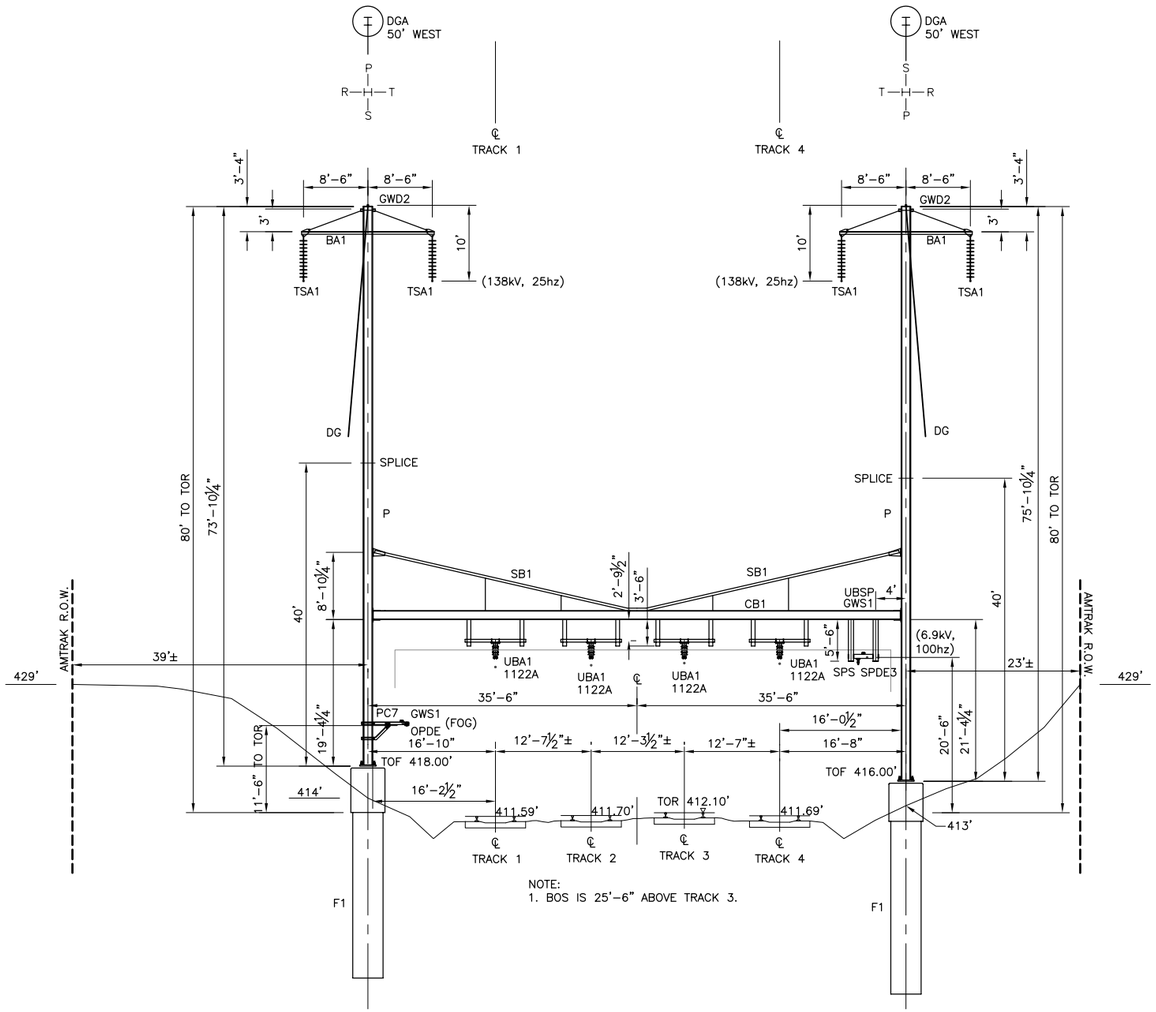
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Ref. No.:	2011-059
Sheet No:	082 OF 347

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	20'–11¼"	21'–10"	20'–5½"	20'–10¼"
CW	19'–8½"	19'–10"	19'–9"	20'–0¾"

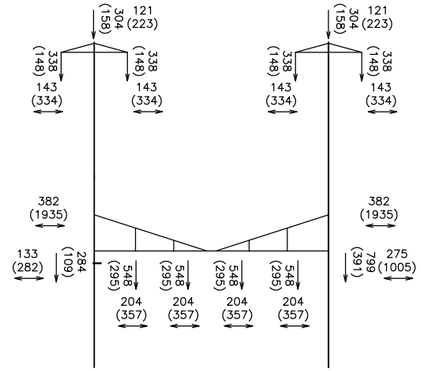


NOTE:
1. BOS IS 25'–6" ABOVE TRACK 3.

STRUCTURE ERECTION DIAGRAM T–228

523+81
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
225' LOAD SPAN TRANSMISSION
130' LOAD SPAN CATENARY
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
1122A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
GWS1	GROUND WIRE SUPPORT	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPDE	FOG WIRE DEADEND	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
SPDE3	SIGNAL POWER DEADEND	ET–1913	1
DG	DOWN GUY ASSEMBLY	ET–1908	2
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
UBA1	UNDER BRIDGE BRACKET	S–5228	4
UBSP	SIGNAL POWER BRACKET	S–5240	1
PC4	SIDING BRACKET	S–5215	1
PC7	SIDING BRACKET	S–5239	1
DGA	DOWN GUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–228

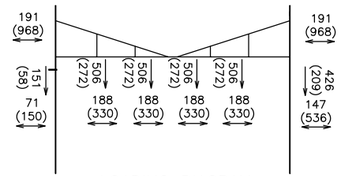
File No.:	2011–059–ET–1428.DWG
Ref. No.:	2011–059
Sheet No:	083 OF 347

ET–1428

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

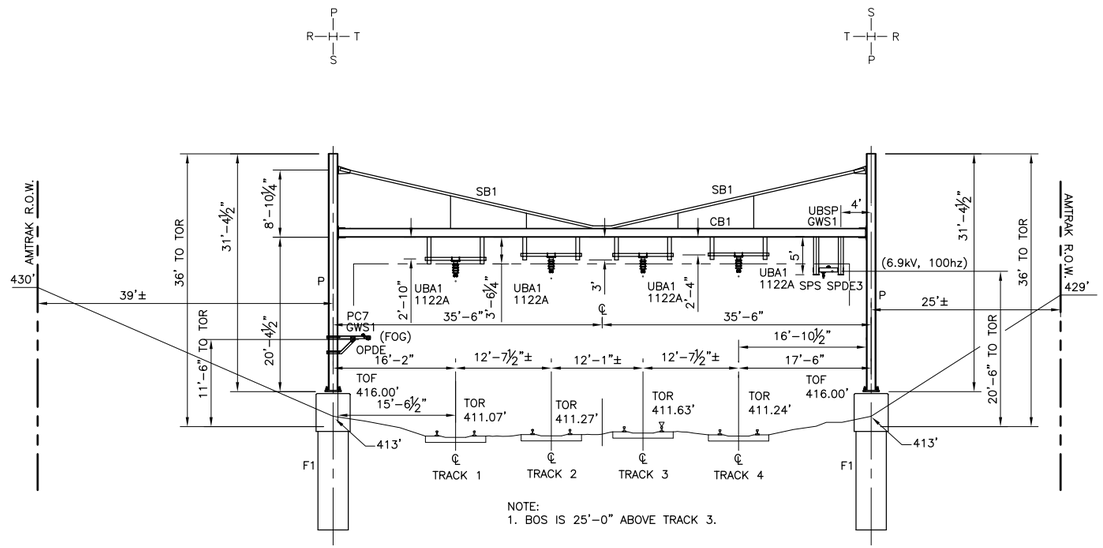
3/14/2016 4:18:04 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1428.dwg

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
1122A	UNDER BRIDGE INSULATOR	ET–1904	4
GWS1	GROUND WIRE SUPPORT	ET–1909	2
OPDE	FOG WIRE DEADEND	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
SPDE3	SIGNAL POWER DEADEND	ET–1913	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
UBA1	UNDER BRIDGE BRACKET	S–5228	4
UBSP	SIGNAL POWER BRACKET	S–5240	1
PC4	SLIDING BRACKET	S–5215	1
PC7	SLIDING BRACKET	S–5239	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
120' LOAD SPAN
(NOT TO SCALE)



NOTE:
1. BOS IS 25'–0" ABOVE TRACK 3.

STRUCTURE ERECTION DIAGRAM T–227

523+19
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–227

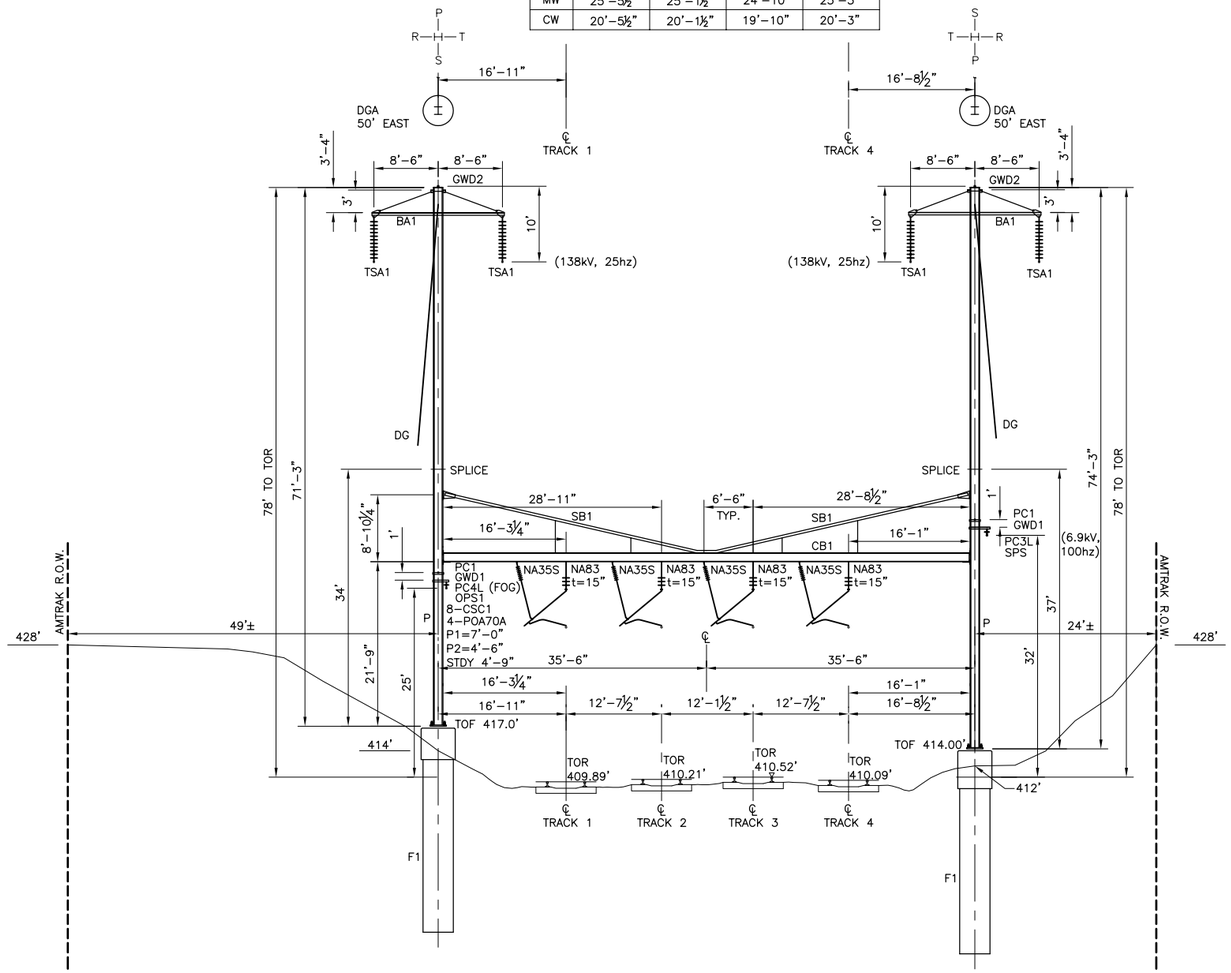
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1429.DWG
Ref. No.:	2011–059
Sheet No:	084 OF 347

ET–1429

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–5½"	25'–1½"	24'–10"	25'–3"
CW	20'–5½"	20'–1½"	19'–10"	20'–3"



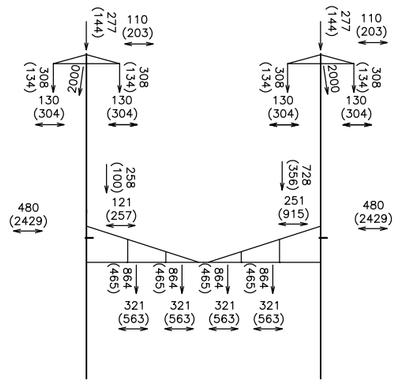
STRUCTURE ERECTION DIAGRAM T–226

521+99

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
205' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
GWD1	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG	DOWNGUY	ET–1908	2
PC1	SLIDING CLAMP	S–5214	2
PC3L	SLIDING CLAMP	S–5215	1
PC4L	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING CLAMP	S–5214	8
DGA	DOWN GUY FOUNDATION	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–226

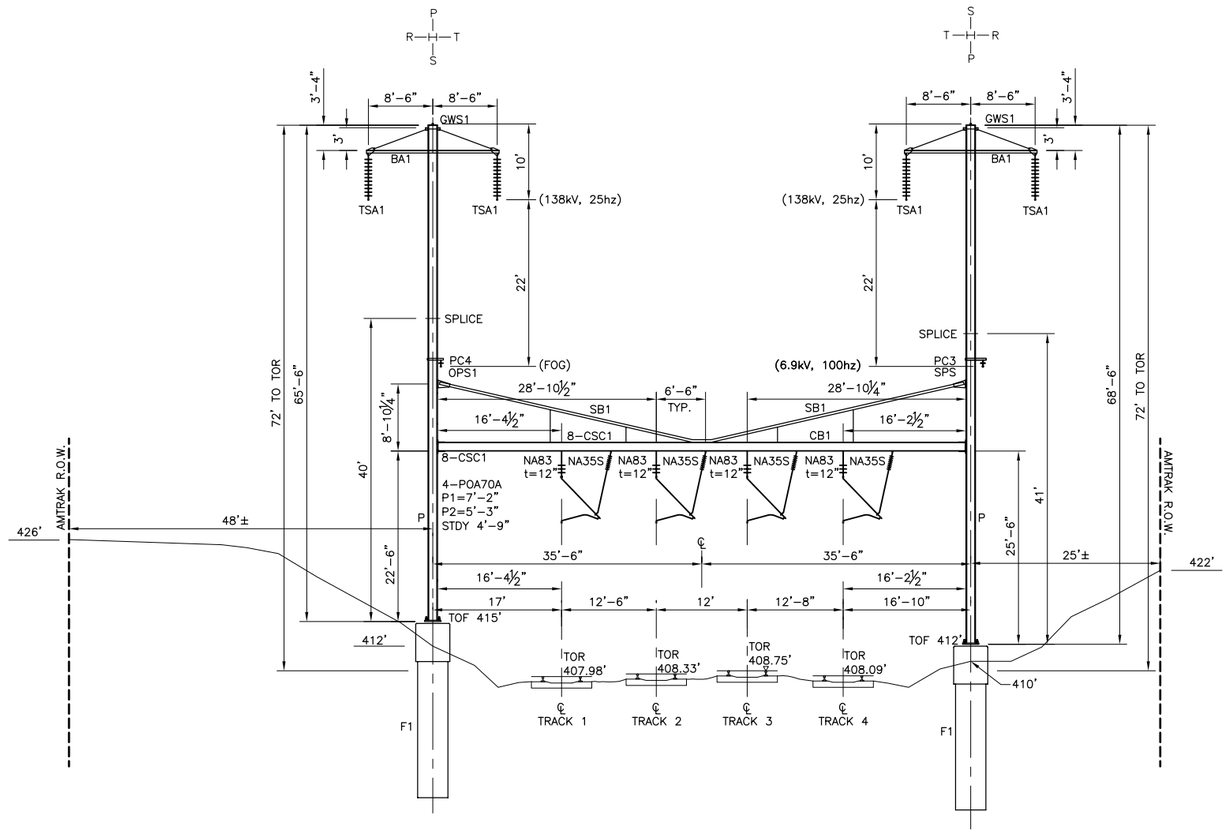
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1430.DWG
Ref. No.:	2011–059
Sheet No:	085 OF 347

ET–1430

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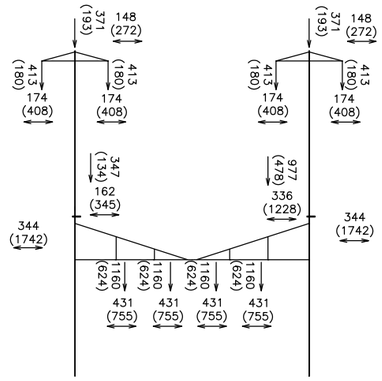
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-4¼"	26'-0"	25'-7"	26'-3"
CW	20'-4¼"	20'-0"	19'-7"	20'-3"



STRUCTURE ERECTION DIAGRAM T-225

519+09
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	2
CSC1	SLIDING CLAMP	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-225

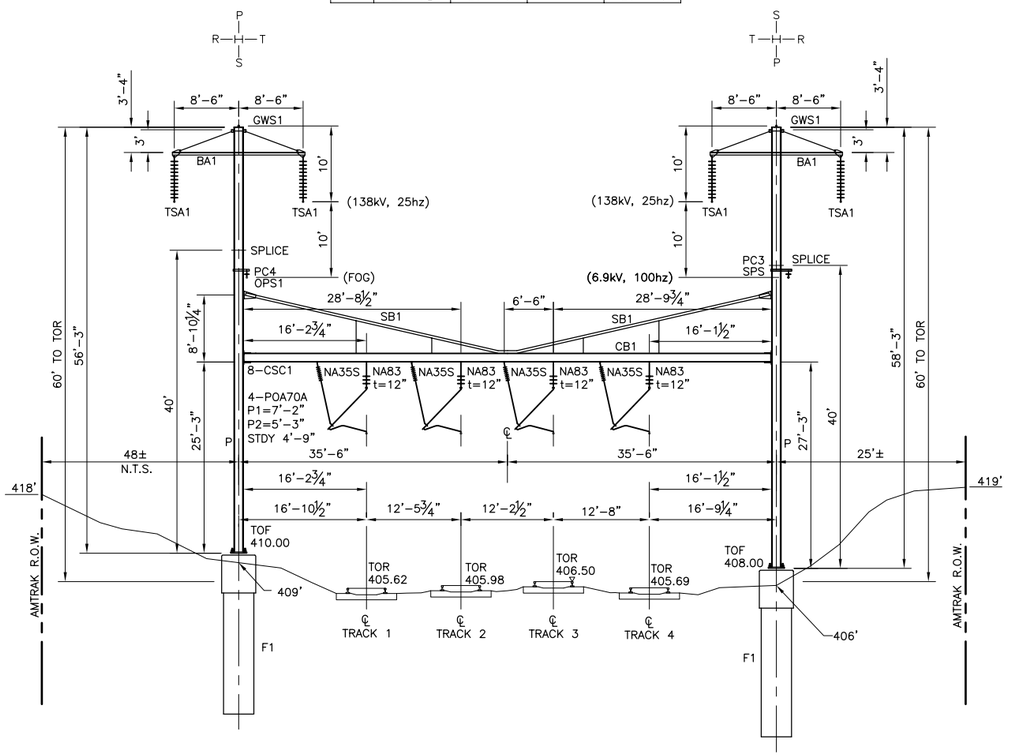
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1431.DWG
Ref. No.:	2011-059
Sheet No:	086 OF 347

ET-1431

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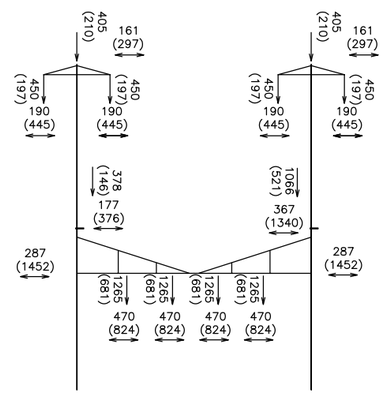
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–5½"	26'–10"	25'–7"	26'–4¾"
CW	20'–5½"	20'–1¼"	19'–7"	20'–4¾"



STRUCTURE ERECTION DIAGRAM T–224

516+08
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET – DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–224

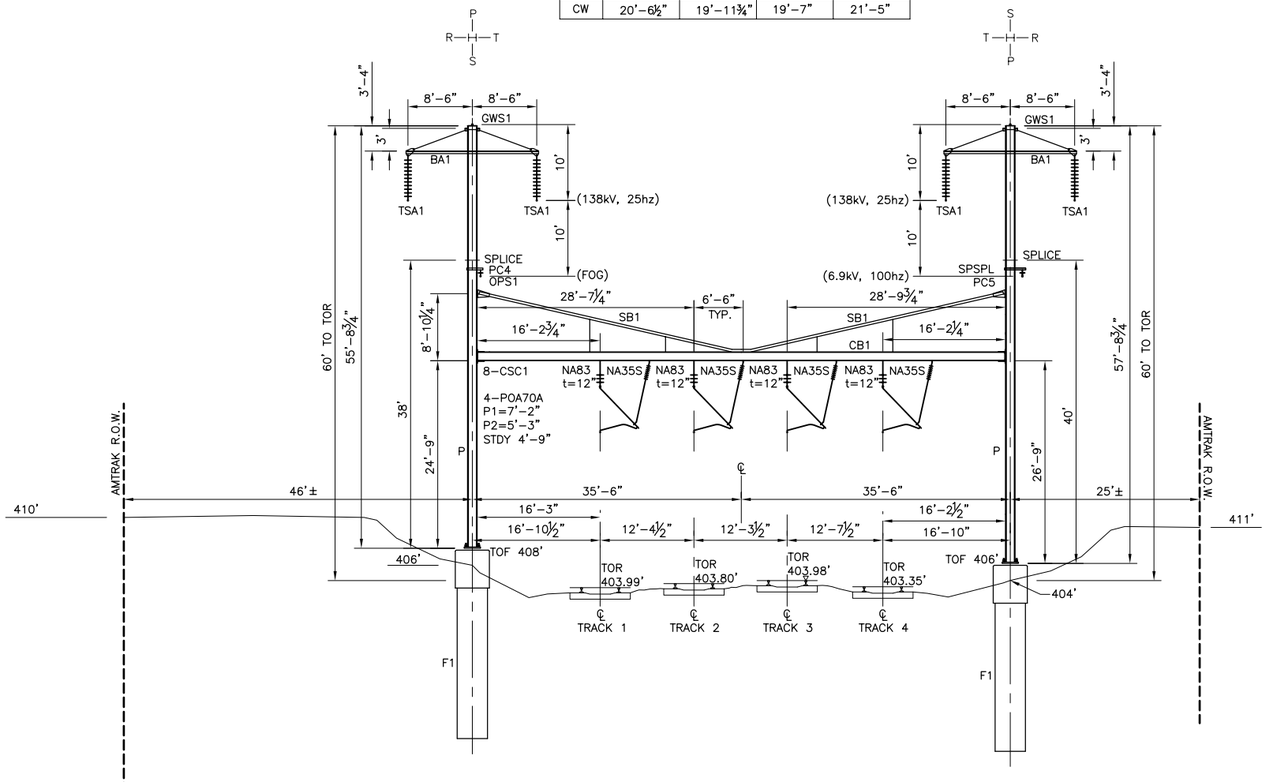
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Ref. No.:	2011–059
Sheet No:	087 OF 347

ET–1432

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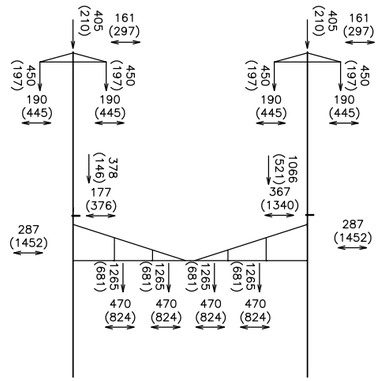
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–6½"	25'–11¾"	25'–7"	26'–5"
CW	20'–6½"	19'–11¾"	19'–7"	21'–5"



STRUCTURE ERECTION DIAGRAM T–223

513+09
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–223

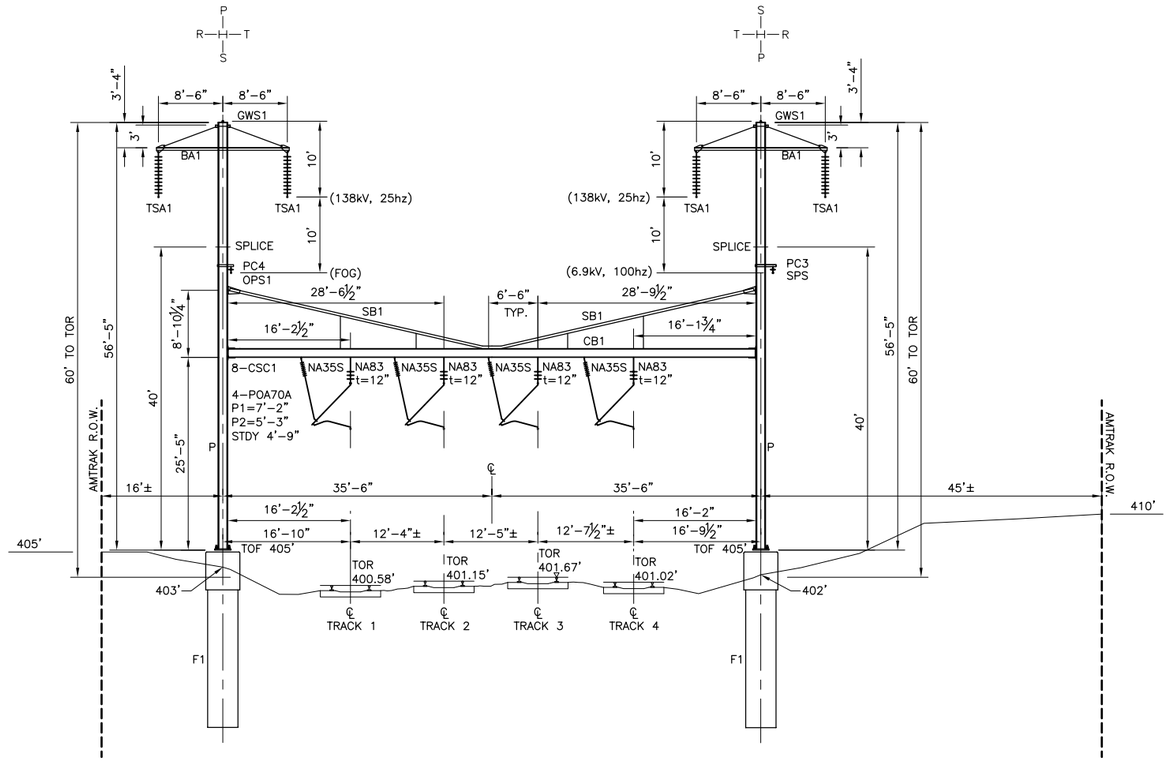
File No.:	2011–059–ET–1433.DWG
Ref. No.:	2011–059
Sheet No:	088 OF 347

ET–1433

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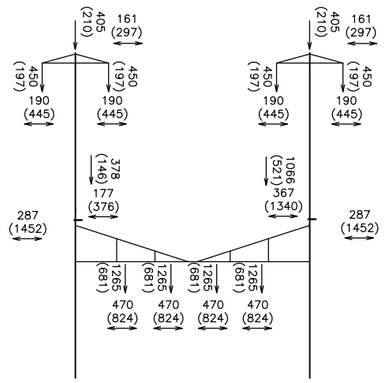
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–8¼"	26'–1¼"	25'–7"	26'–3"
CW	20'–8¼"	20'–1¼"	19'–7"	20'–3"



STRUCTURE ERECTION DIAGRAM T–222

510+09
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–222

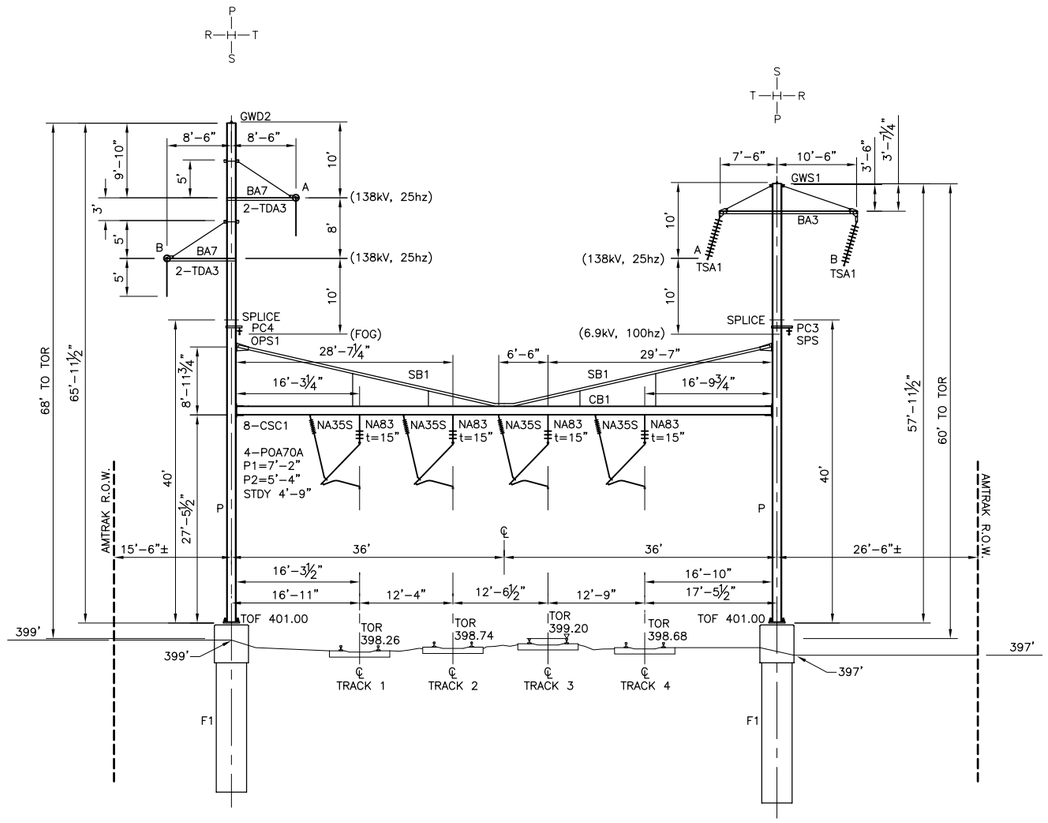
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1434.DWG
Ref. No.:	2011–059
Sheet No:	089 OF 347

ET–1434

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–9¼"	26'–3½"	25'–10"	26'–4¼"
CW	20'–9¼"	20'–3½"	19'–10"	20'–4¼"



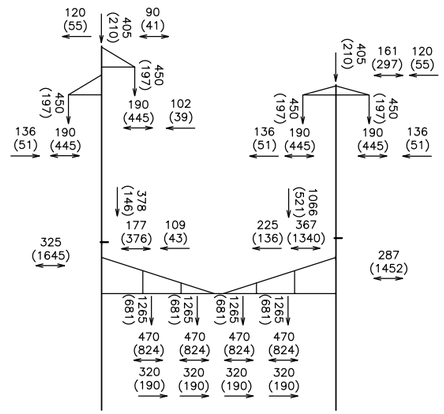
STRUCTURE ERECTION DIAGRAM T–221

507+09

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET –DOUBLE	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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OFFICE OF
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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–221

File No.:	2011–059–ET–1435.DWG
Ref. No.:	2011–059
Sheet No:	090 OF 347

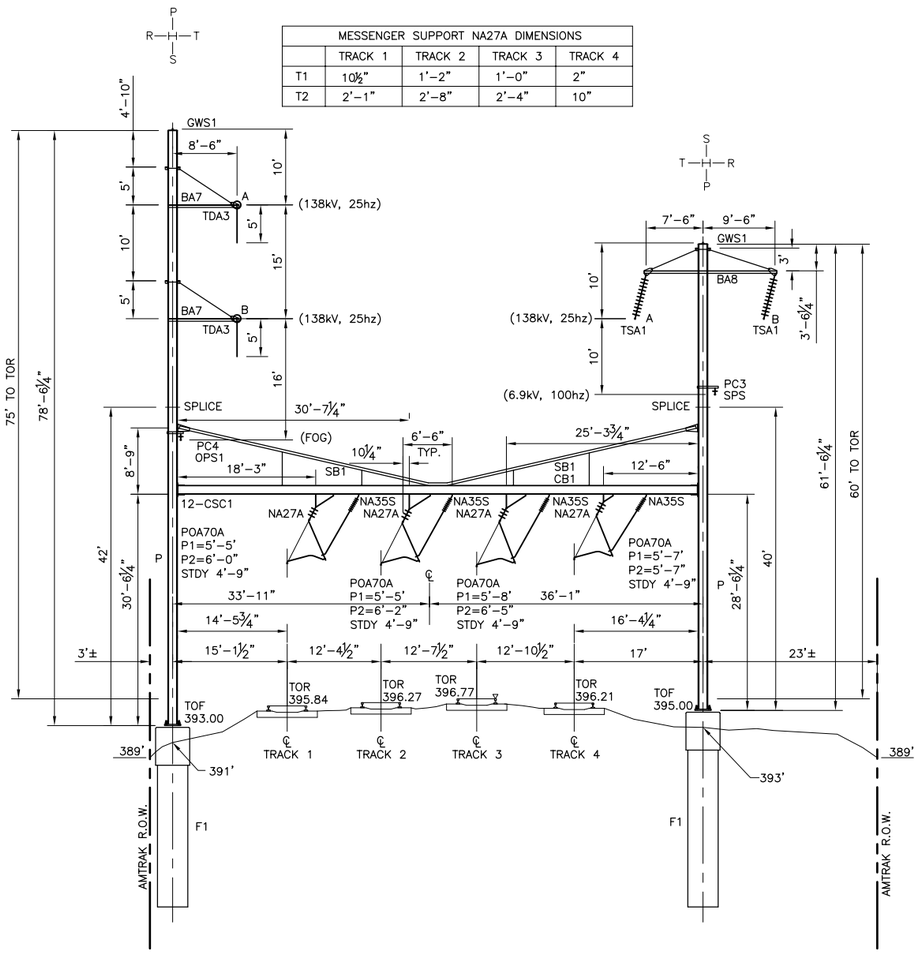
ET–1435

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–6¾"	23'–10¼"	23'–6"	24'–10½"
CW	18'–10"	18'–2¼"	17'–6"	18'–11¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	10½"	1'–2"	1'–0"	2"
T2	2'–1"	2'–8"	2'–4"	10"



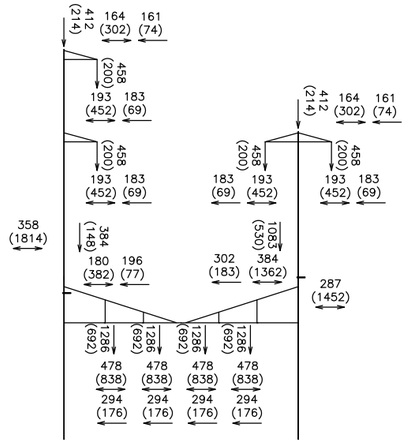
STRUCTURE ERECTION DIAGRAM T–220

504+10

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	2
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	2
BA8	TRANSMISSION BRACKET	S–5206	1
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–220

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

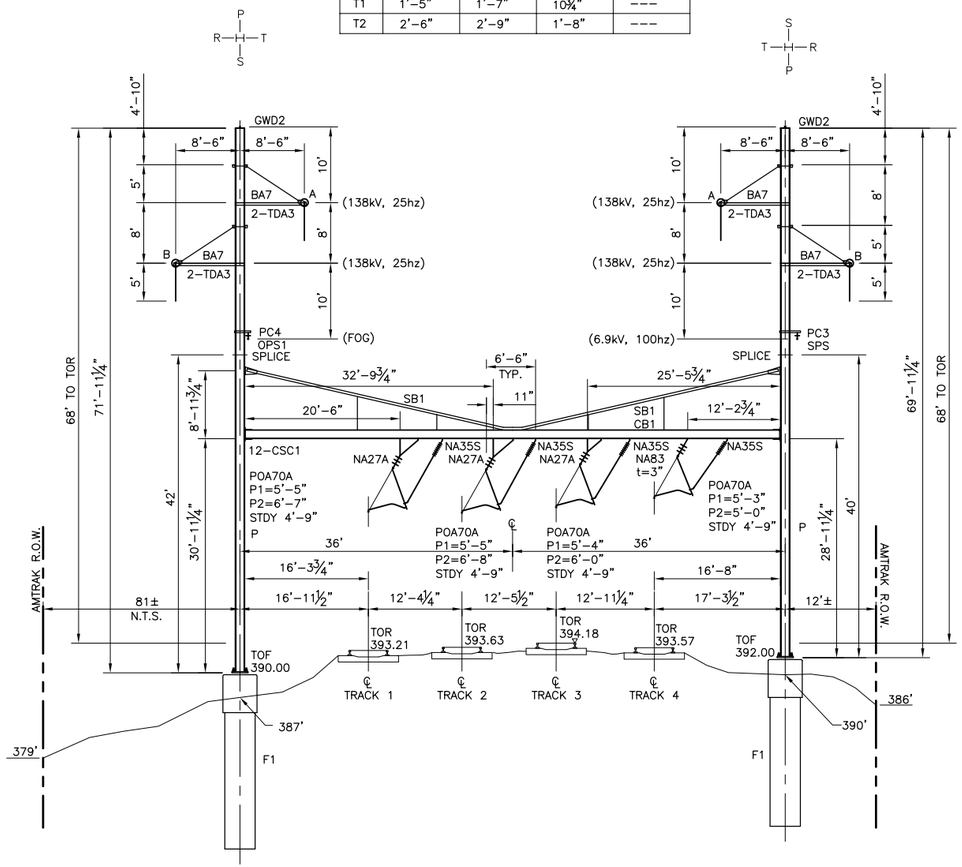
File No.:	2011–059–ET–1436.DWG
Ref. No.:	2011–059
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ET–1436

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–1½"	23'–6"	23'–7¾"	25'–4"
CW	18'–4"	17'–9¼"	17'–11½"	19'–9½"

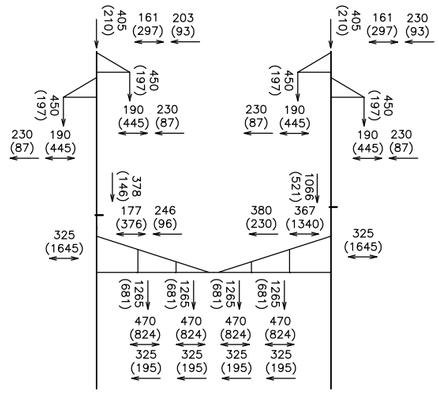
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–5"	1'–7"	10¾"	---
T2	2'–6"	2'–9"	1'–8"	---



STRUCTURE ERECTION DIAGRAM T–219

501+09
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	3
NA83	MESSENGER SUPPORT	ET–1904	1
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	4
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–219

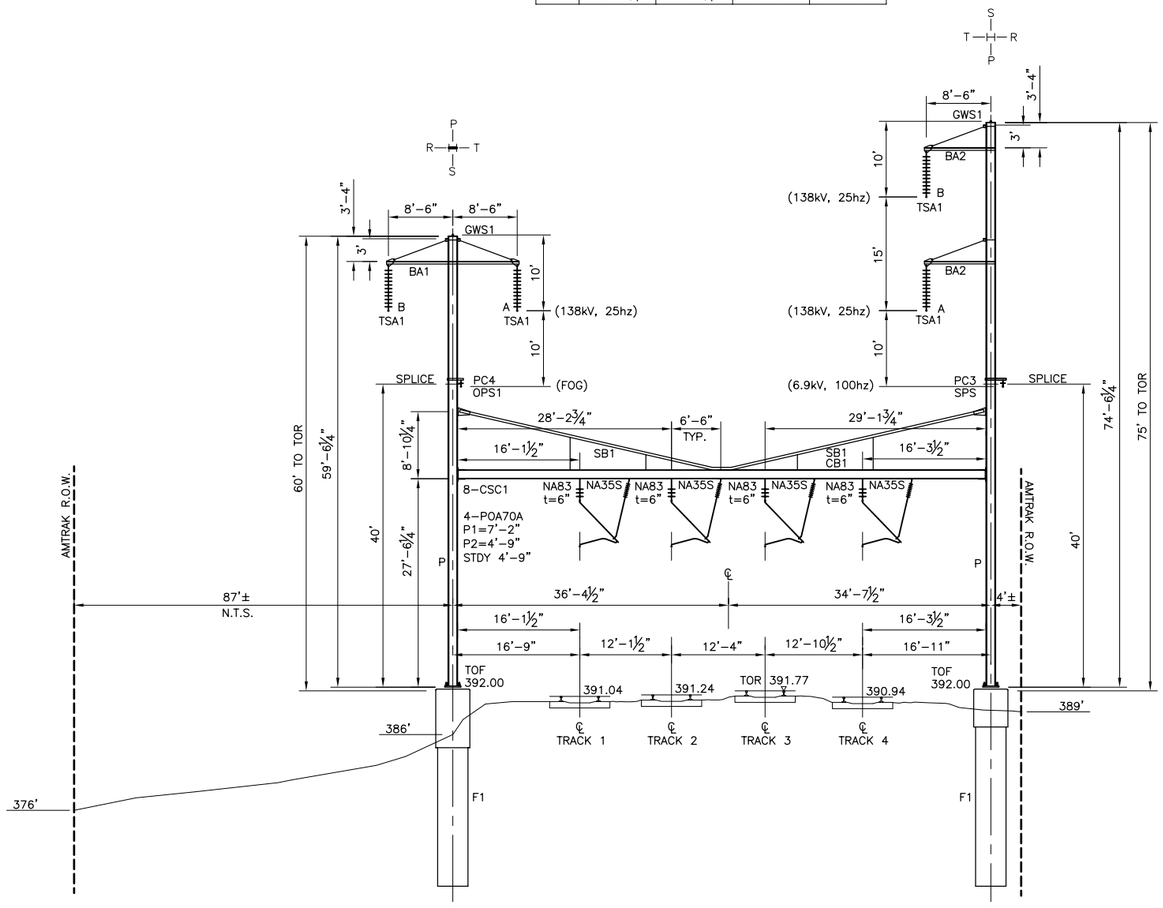
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1437.DWG
Ref. No.:	2011–059
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ET–1437

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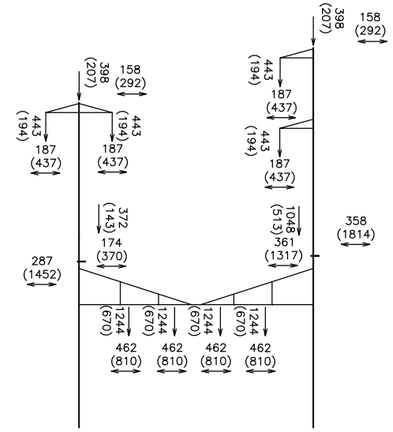
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–9¾"	25'–7¼"	25'–2"	25'–11"
CW	19'–9¾"	19'–7¼"	19'–2"	19'–11"



STRUCTURE ERECTION DIAGRAM T–218

498+10
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING CLAMP	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–218

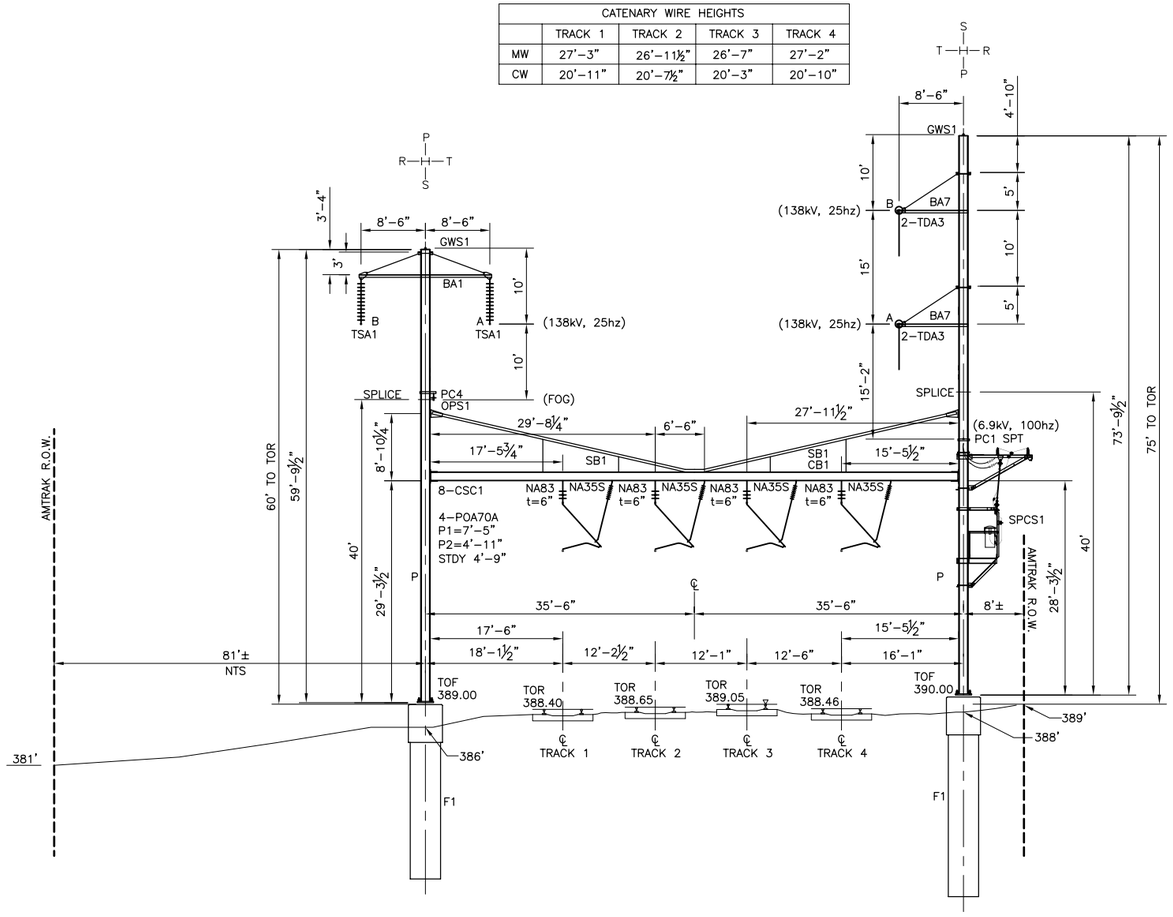
File No.:	2011–059–ET–1438.DWG
Ref. No.:	2011–059
Sheet No:	093 OF 347

ET–1438

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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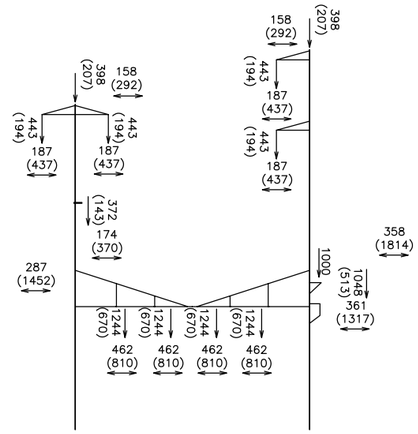
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–3"	26'–11½"	26'–7"	27'–2"
CW	20'–11"	20'–7½"	20'–3"	20'–10"



STRUCTURE ERECTION DIAGRAM T–217

495+19
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
CSC1	SLIDING CLAMP	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

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AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–217

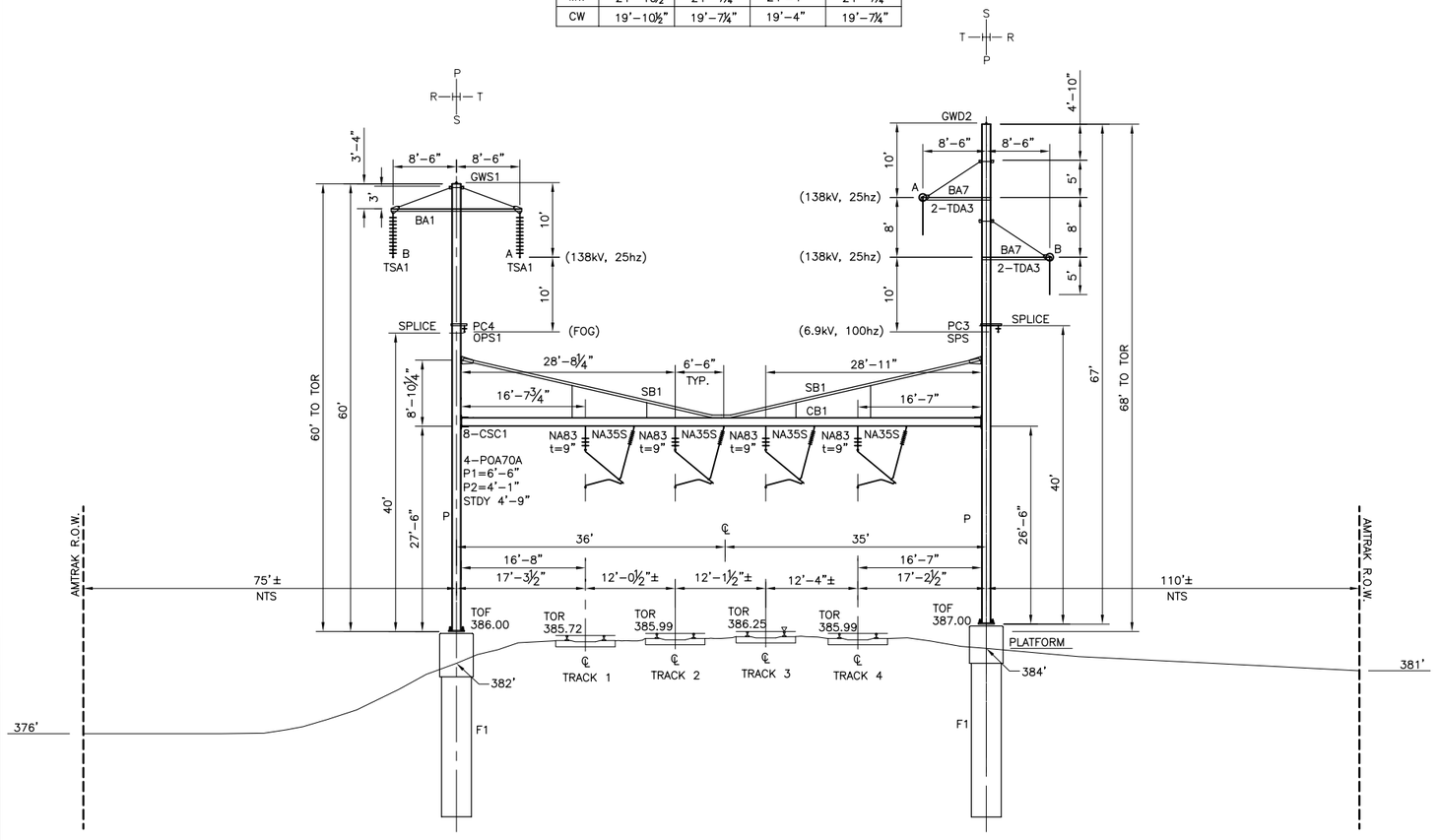
Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1439.DWG
Ref. No.:	2011–059
Sheet No:	094 OF 347

ET–1439

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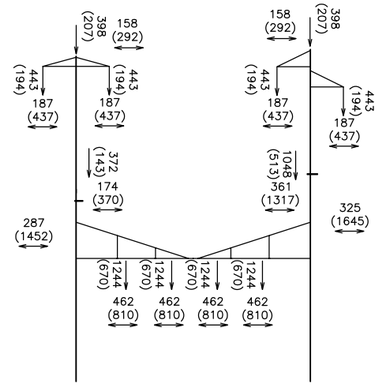
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–10½"	24'–7¼"	24'–4"	24'–7¼"
CW	19'–10½"	19'–7¼"	19'–4"	19'–7¼"



STRUCTURE ERECTION DIAGRAM T–216

492+95
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–216

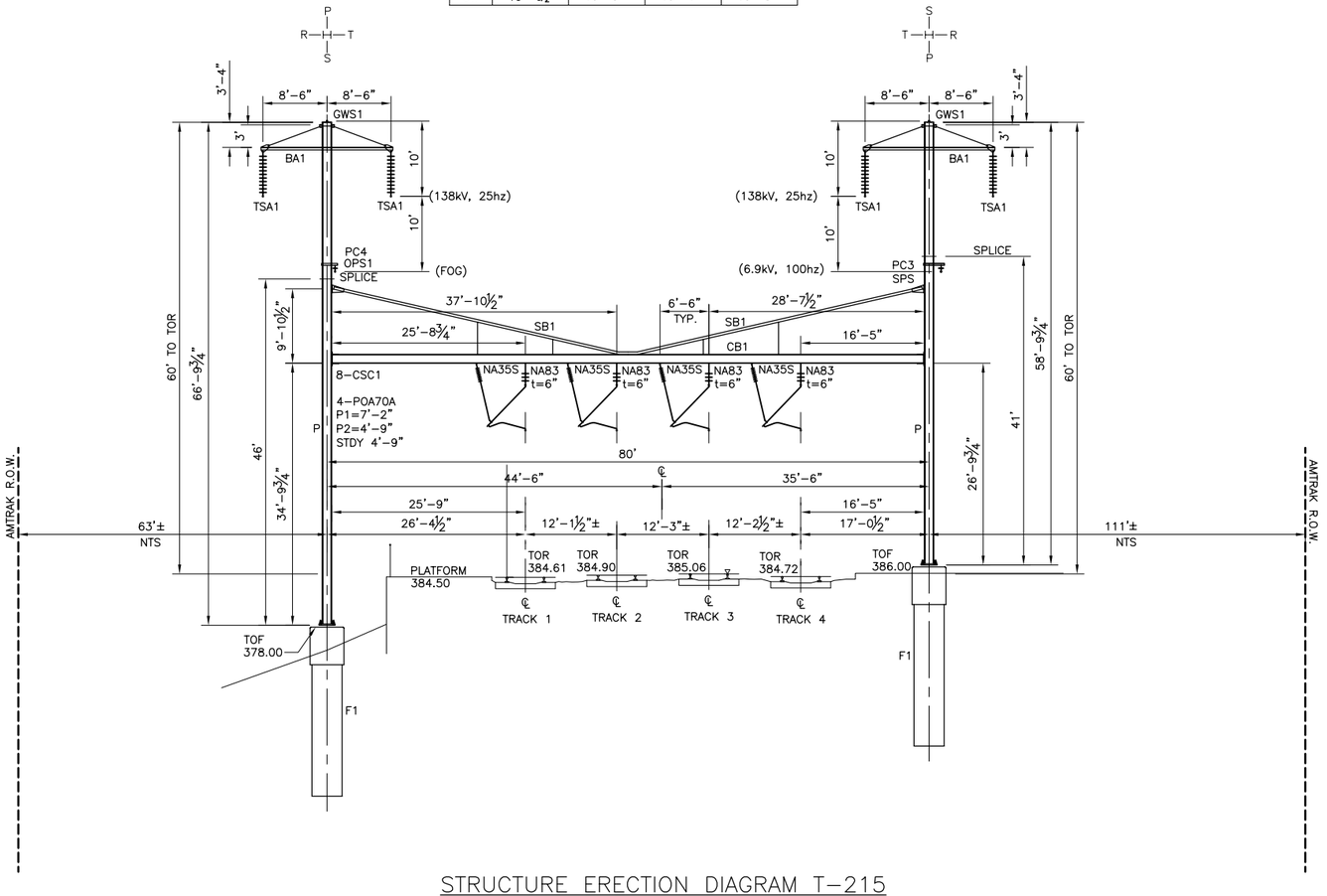
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Ref. No.:	2011–059
Sheet No:	095 OF 347

ET–1440

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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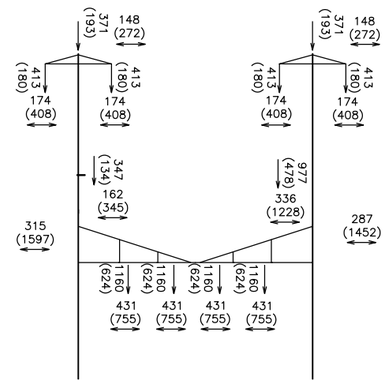
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–6½"	25'–3"	25'–1"	25'–5"
CW	19'–6½"	19'–3"	19'–1"	19'–5"



STRUCTURE ERECTION DIAGRAM T–215

490+70
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
275' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–215

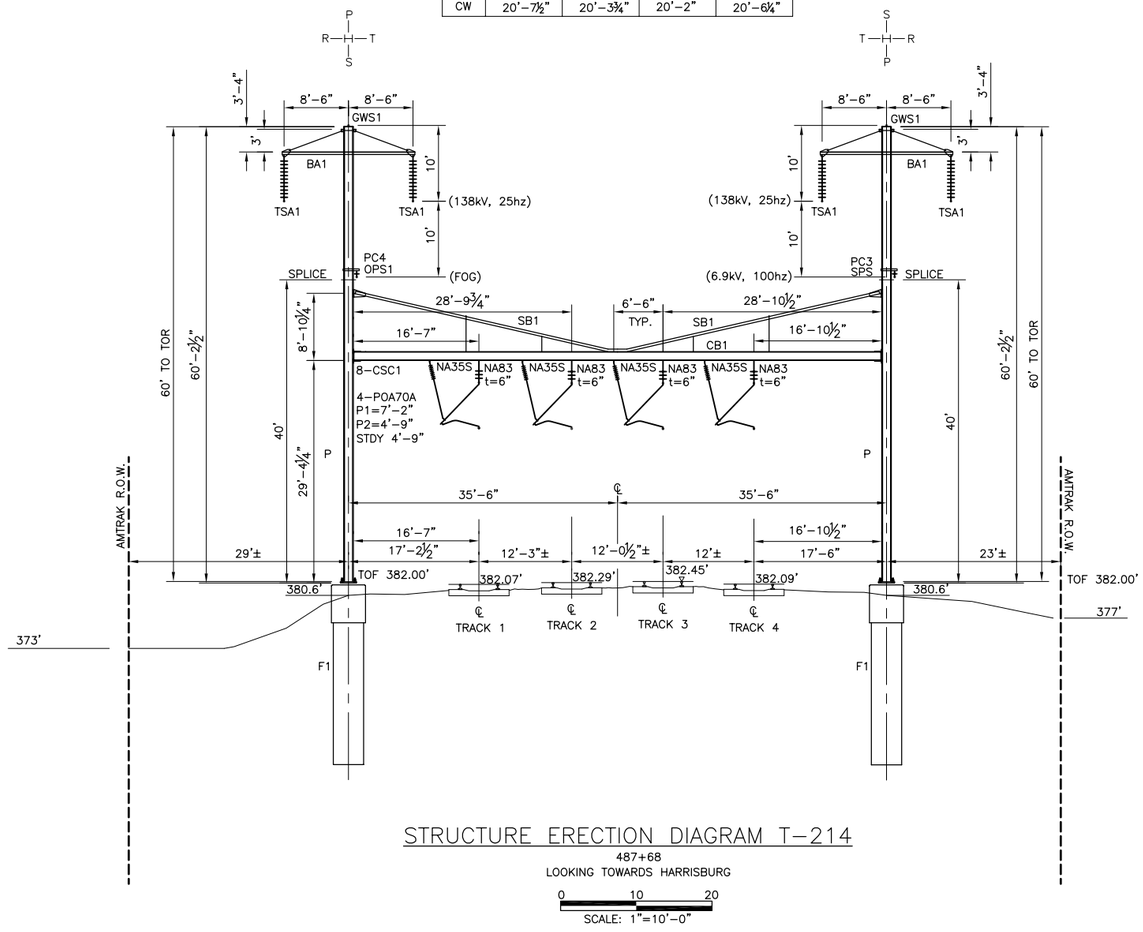
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1441.DWG
Ref. No.:	2011–059
Sheet No:	096 OF 347

ET–1441

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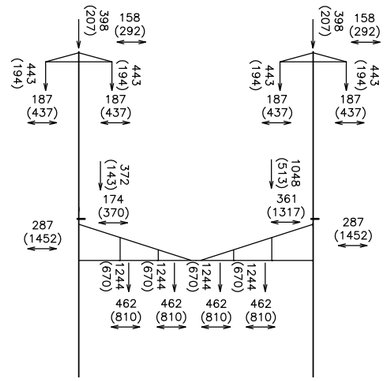
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–7½"	26'–3¾"	26'–2"	26'–6¼"
CW	20'–7½"	20'–3¾"	20'–2"	20'–6¼"



STRUCTURE ERECTION DIAGRAM T–214

487+68
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–214

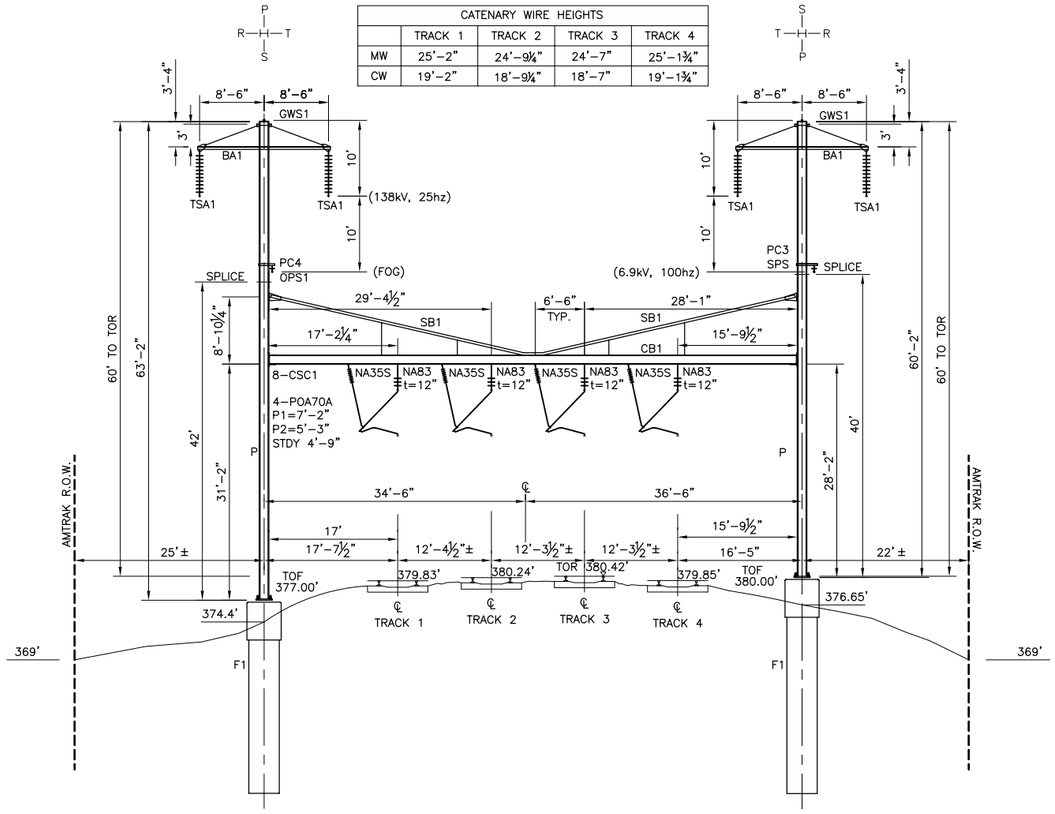
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Ref. No.:	2011–059
Sheet No:	097 OF 347

ET–1442

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–2"	24'–9¼"	24'–7"	25'–1¾"
CW	19'–2"	18'–9¼"	18'–7"	19'–1¾"



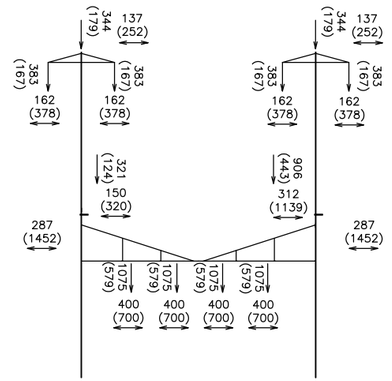
STRUCTURE ERECTION DIAGRAM T–213

484+64

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–213

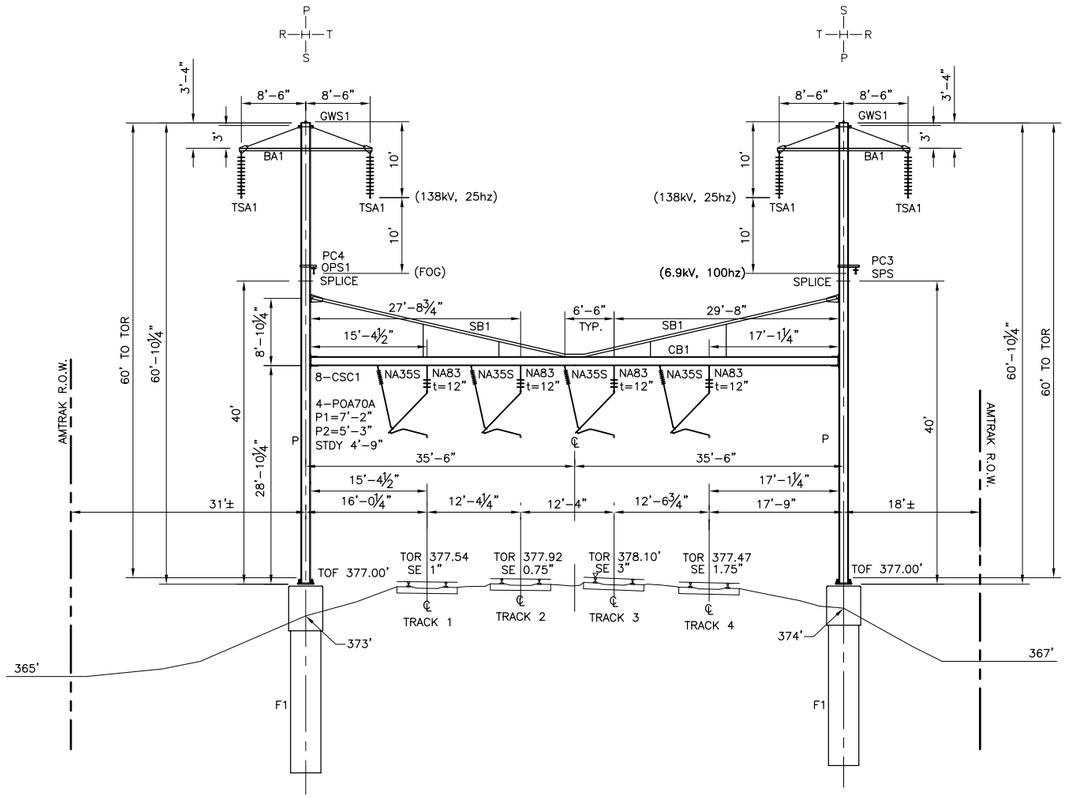
File No.:	2011–059–ET–1443.DWG
Ref. No.:	2011–059
Sheet No:	098 OF 347

ET–1443

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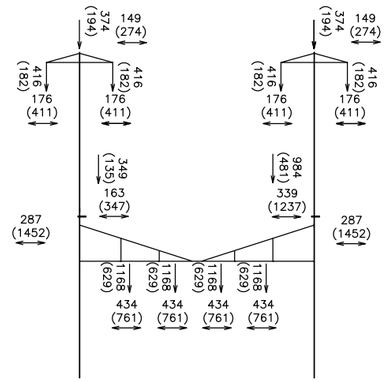
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–1¼"	24'–8¾"	24'–7"	25'–2½"
CW	19'–1¼"	18'–8¾"	18'–7"	19'–2½"



STRUCTURE ERECTION DIAGRAM T–212

481+64
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
277' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–212

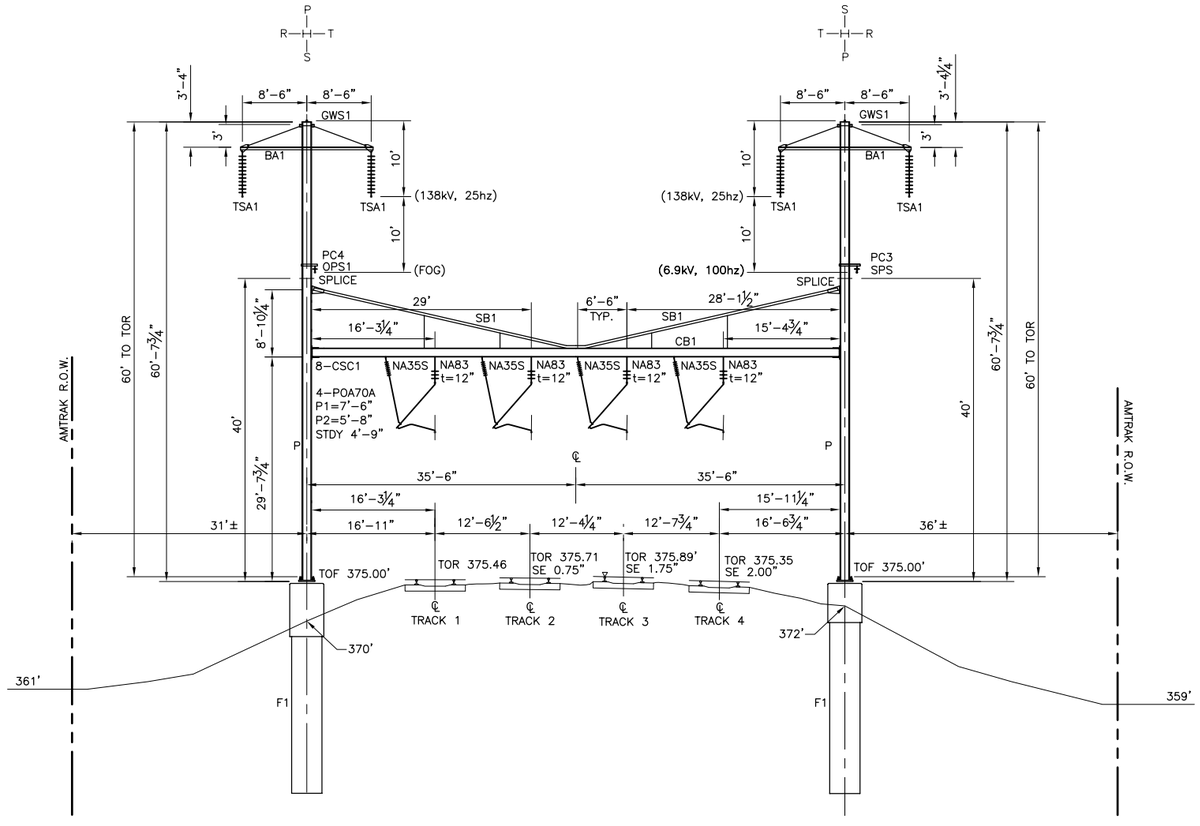
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Ref. No.:	2011–059
Sheet No:	099 OF 347

ET–1444

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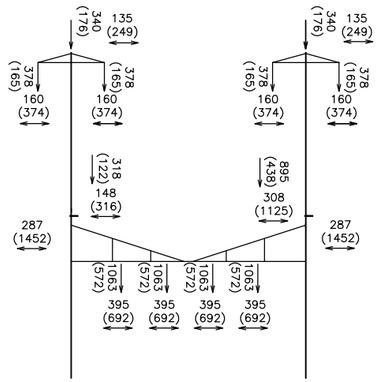
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–11¾"	25'–9"	25'–7"	26'–1½"
CW	19'–5¾"	19'–3"	19'–1"	19'–7½"



STRUCTURE ERECTION DIAGRAM T–211

479+09
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
252' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Engineering
National Railroad Passenger Corporation
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Approved	Date

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IN ASSOCIATION WITH
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AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–211

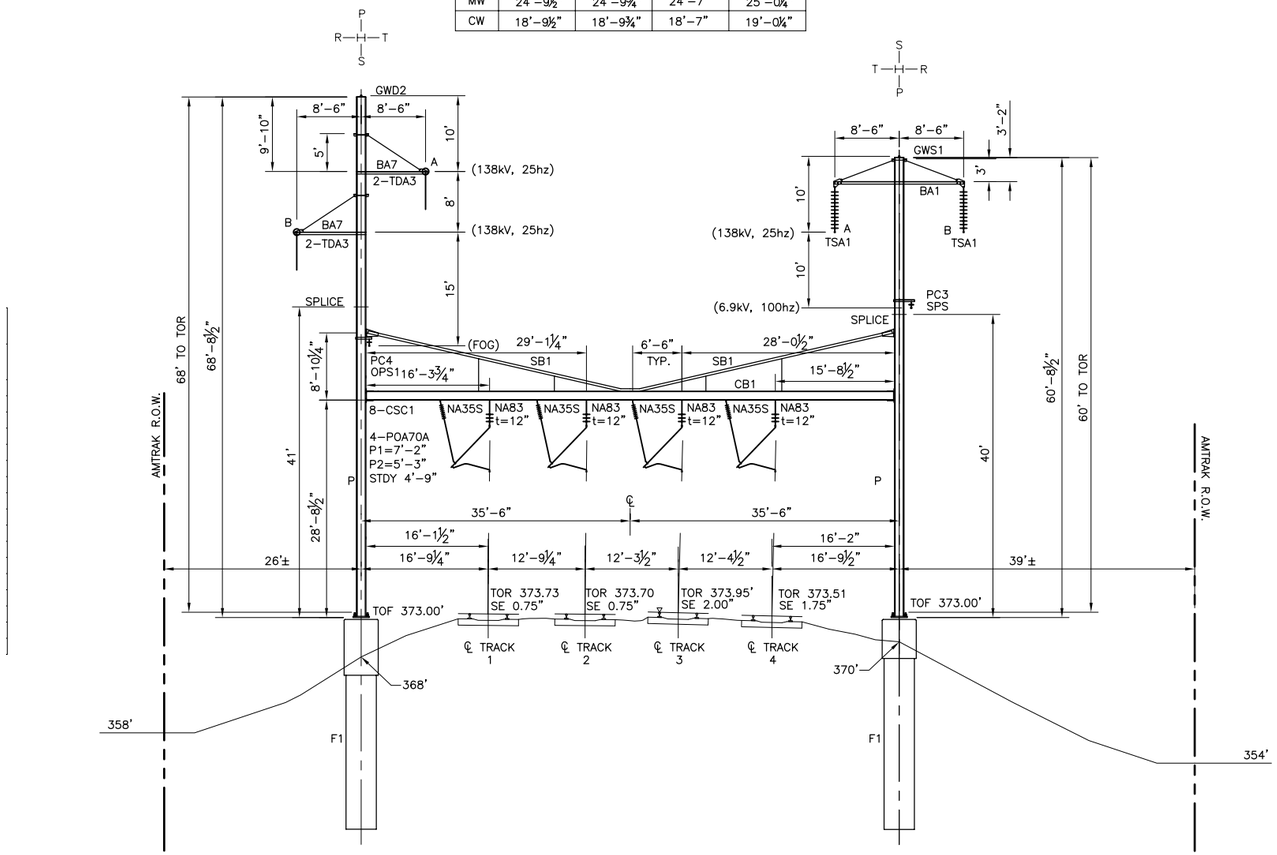
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File No.:	2011–059–ET–1445.DWG
Ref. No.:	2011–059
Sheet No:	100 OF 347

ET–1445

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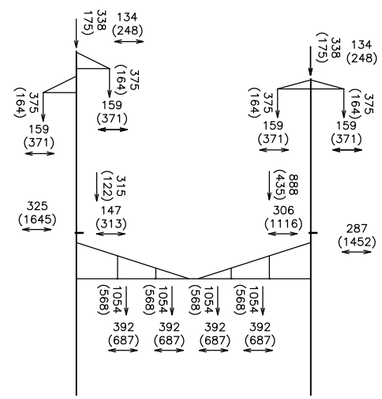
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'-9½"	24'-9¾"	24'-7"	25'-0¼"
CW	18'-9½"	18'-9¾"	18'-7"	19'-0¼"



STRUCTURE ERECTION DIAGRAM T-210

476+59
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
250' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
GWD2	GROUND WIRE DEADEND	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET -DOUBLE	S-5200	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-210

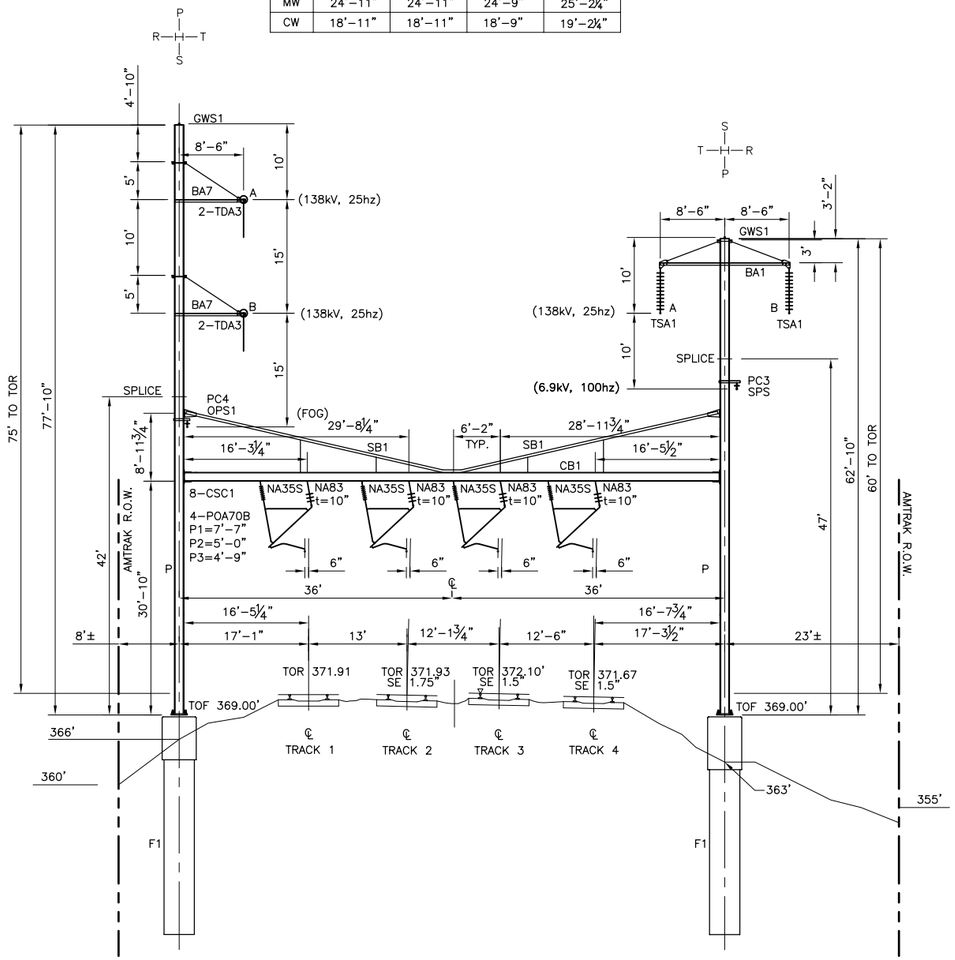
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1446.DWG
Ref. No.:	2011-059
Sheet No:	101 OF 347

ET-1446

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–11"	24'–11"	24'–9"	25'–2¼"
CW	18'–11"	18'–11"	18'–9"	19'–2¼"



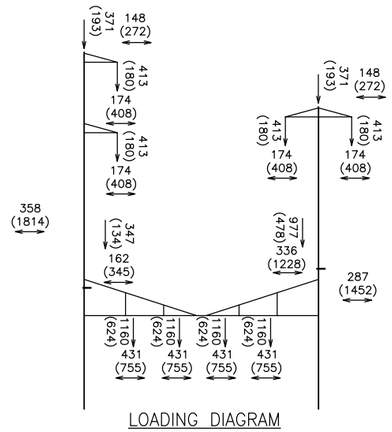
STRUCTURE ERECTION DIAGRAM T–209

474+10

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET – DOUBLE	S–5200	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–209

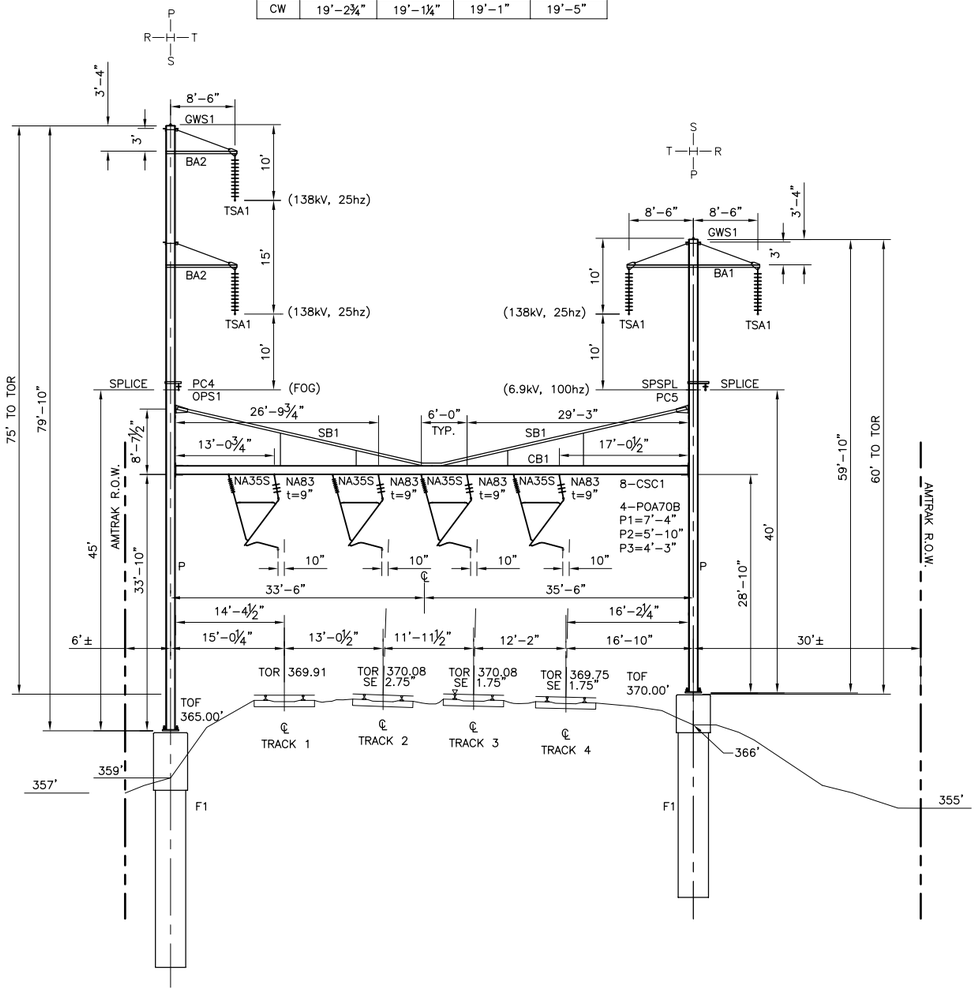
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1447.DWG
Ref. No.:	2011–059
Sheet No:	102 OF 347

ET–1447

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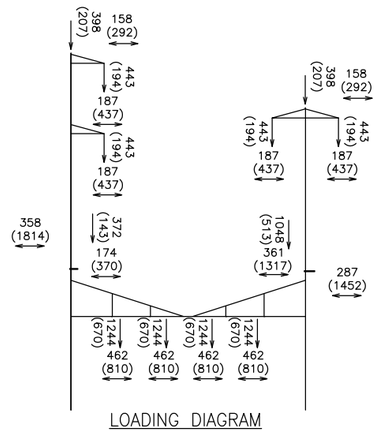
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–11¾"	25'–10¾"	25'–10"	26'–2"
CW	19'–2¾"	19'–1¼"	19'–1"	19'–5"



STRUCTURE ERECTION DIAGRAM T–208

471+10
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–208

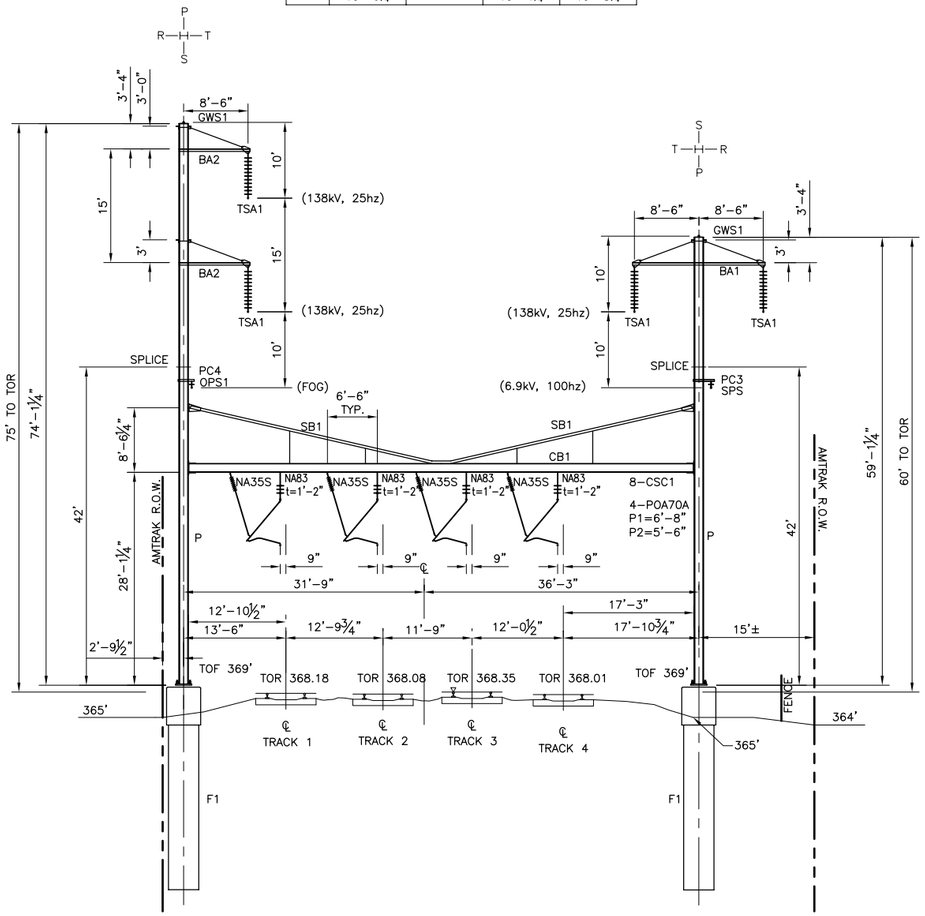
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1448.DWG
Ref. No.:	2011–059
Sheet No:	103 OF 347

ET–1448

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–6¾"	25'–8"	25'–4¾"	25'–8¾"
CW	19'–6¾"	19'–8"	19'–4¾"	19'–8¾"



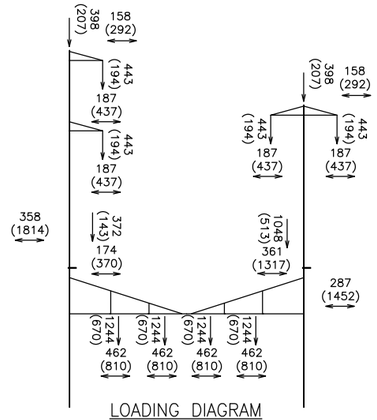
STRUCTURE ERECTION DIAGRAM T–207

468+19

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–207

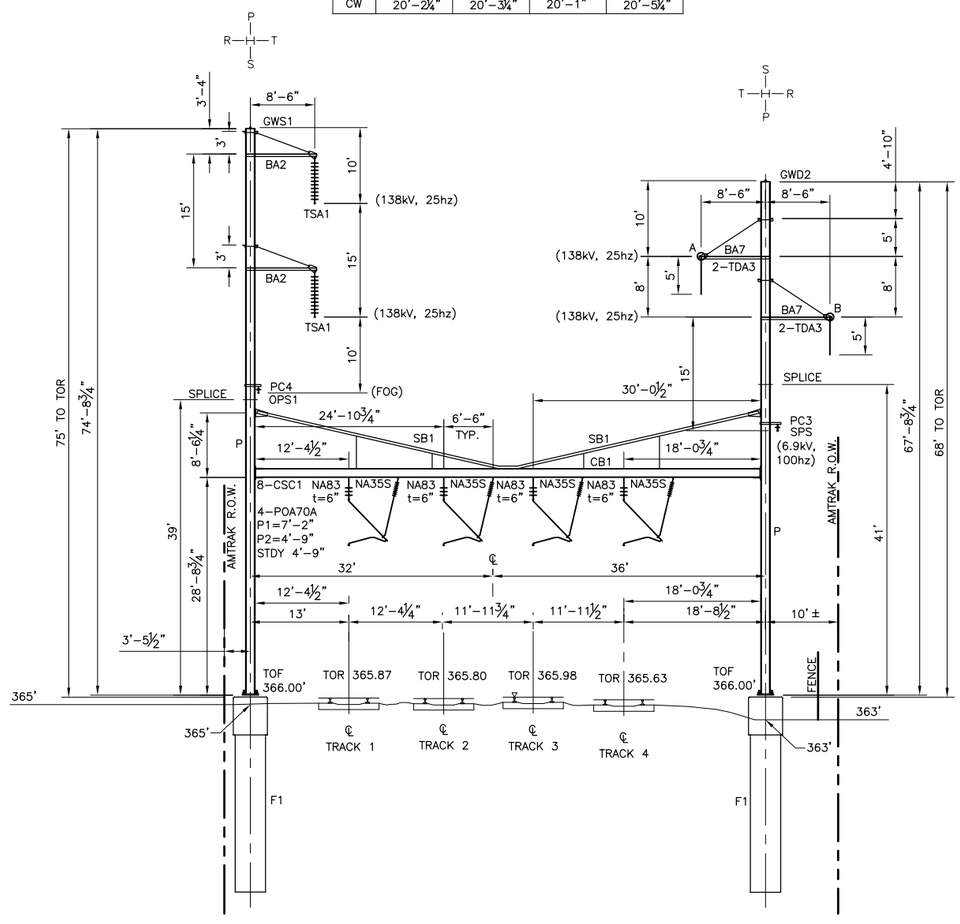
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1449.DWG
Ref. No.:	2011–059
Sheet No:	104 OF 347

ET–1449

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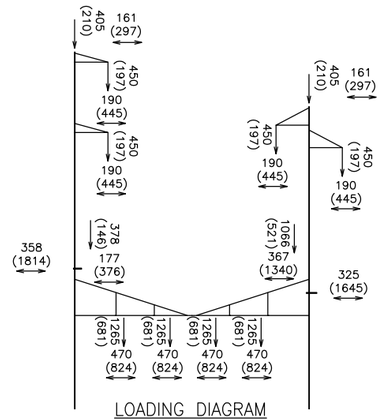
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–2¼"	26'–3¼"	26'–1"	26'–5¼"
CW	20'–2¼"	20'–3¼"	20'–1"	20'–5¼"



STRUCTURE ERECTION DIAGRAM T–206

465+20
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA2	TRANSMISSION BRACKET	S–5201	2
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–206

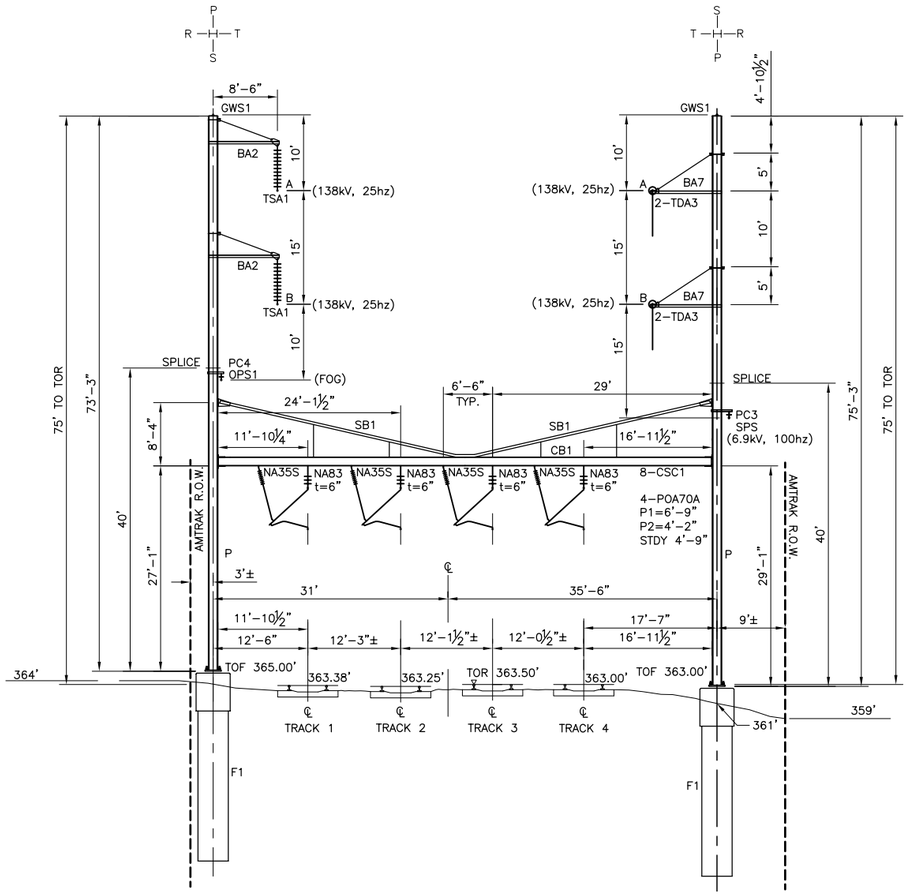
File No.:	2011–059–ET–1450.DWG
Ref. No.:	2011–059
Sheet No:	105 OF 347

ET–1450

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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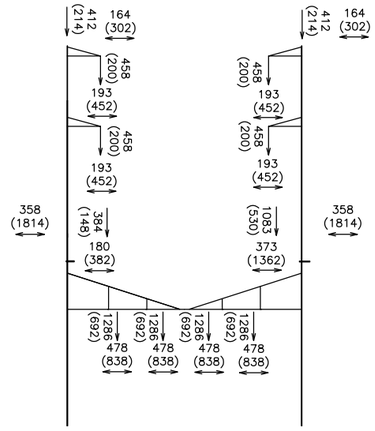
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-0¾"	26'-2"	25'-7¾"	26'-0"
CW	20'-3½"	20'-9¼"	19'-11"	20'-5¾"



STRUCTURE ERECTION DIAGRAM T-205

462+11
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
305' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA7	TRANSMISSION BRACKET -SINGLE	S-5205	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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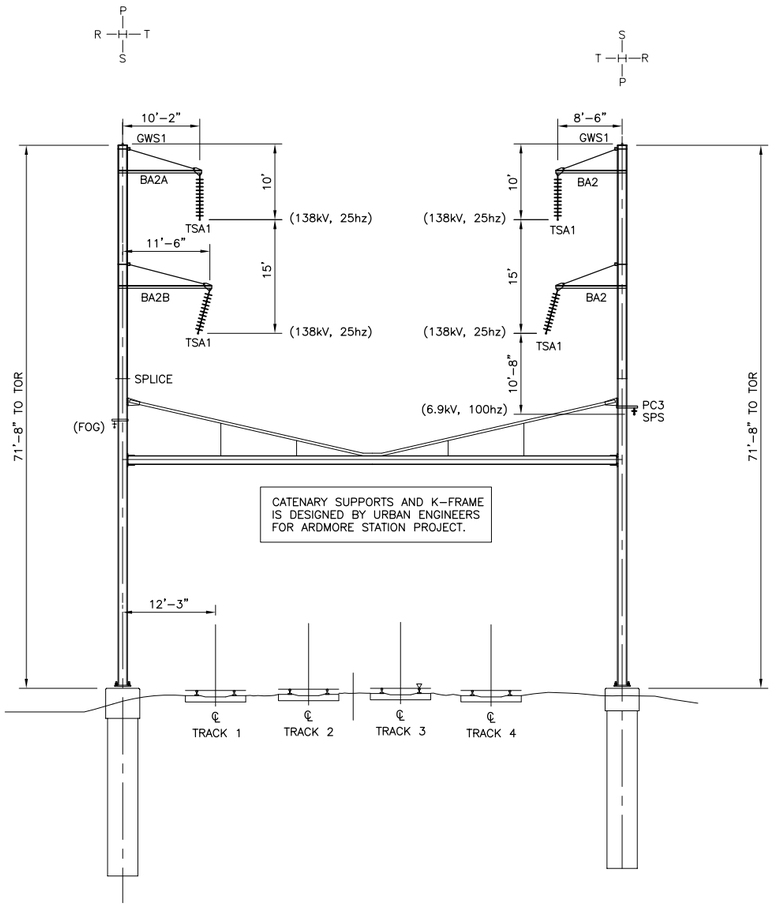
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-205

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1451.DWG
Ref. No.:	2011-059
Sheet No:	106 OF 347

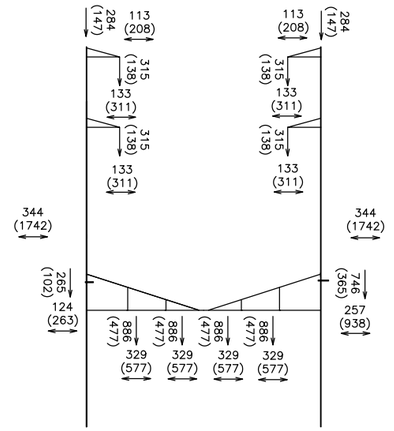
ET-1451



STRUCTURE ERECTION DIAGRAM T–204

460+12
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
210' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
P	POLE EXTENSION & SPLICE	S–5103	2
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
BA2A	TRANSMISSION BRACKET –SINGLE	S–5201	1
BA2B	TRANSMISSION BRACKET –SINGLE	S–5201	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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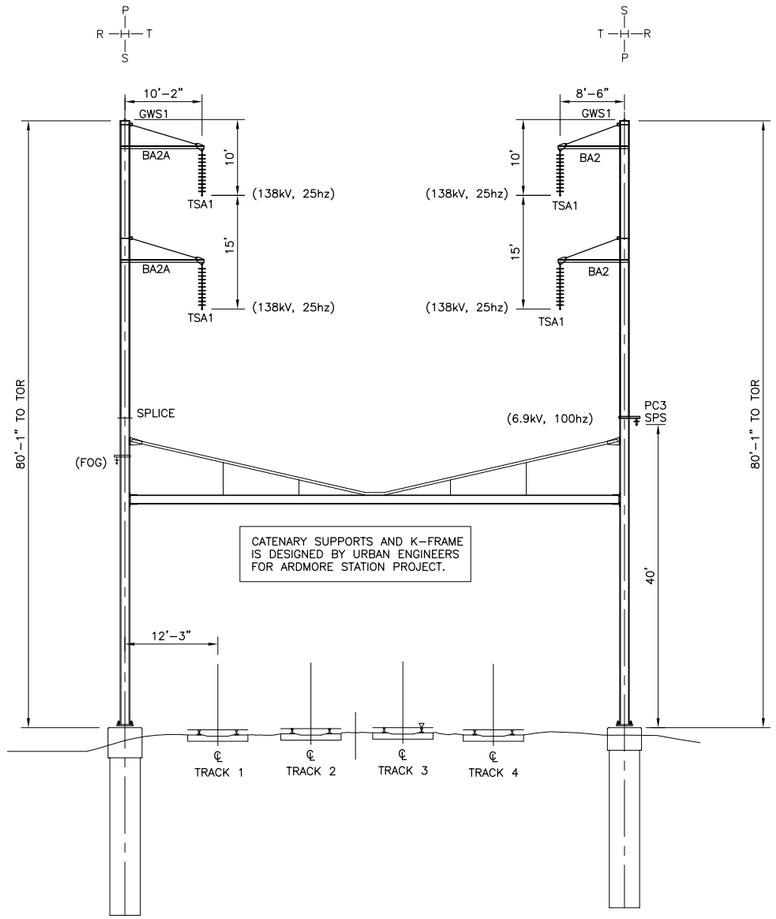
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–204

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1452.DWG
Ref. No.:	2011–059
Sheet No:	107 OF 347

ET–1452

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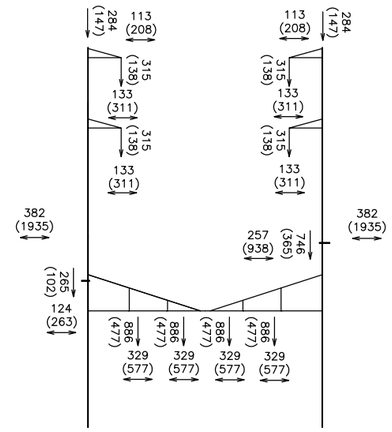
STRUCTURE ERECTION DIAGRAM T–203

458+05

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)

210' LOAD SPAN

(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
P	POLE EXTENSION & SPLICE	S–5103	2
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
BA2A	TRANSMISSION BRACKET –SINGLE	S–5201	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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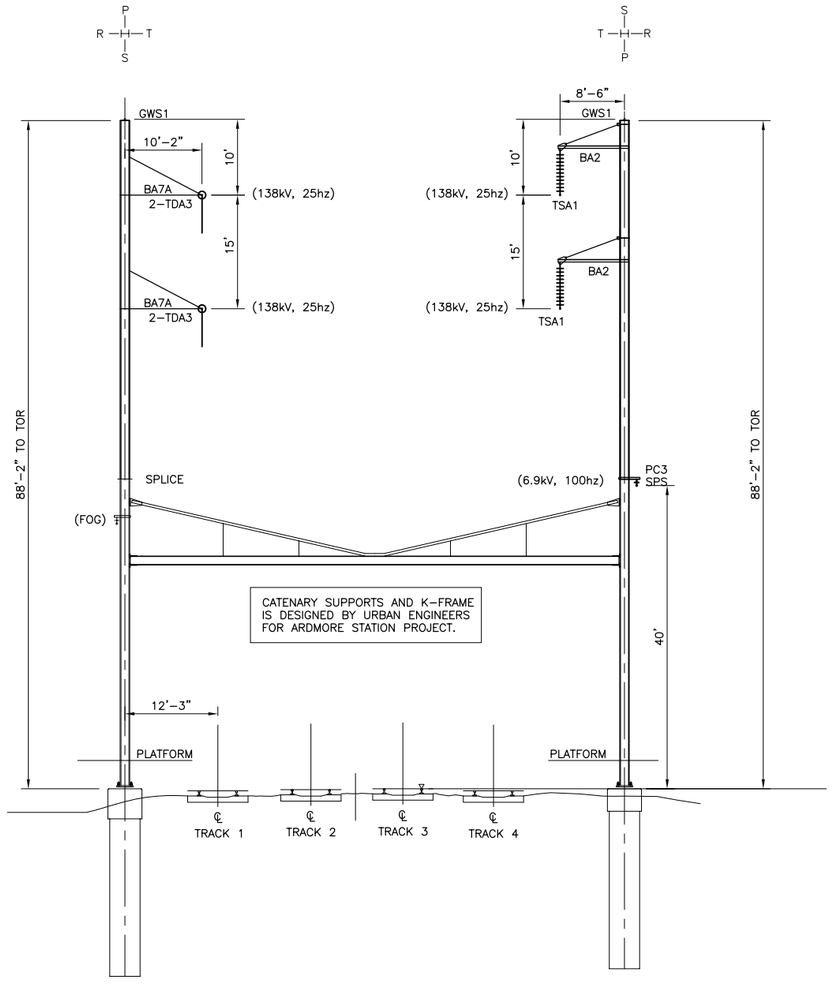
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–203

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1453.DWG
Ref. No.:	2011–059
Sheet No:	108 OF 347

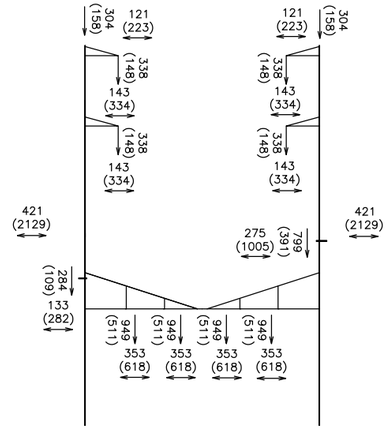
ET–1453



STRUCTURE ERECTION DIAGRAM T-202

455+98
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
225' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION & SPLICE	S-5103	2
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA7A	TRANSMISSION BRACKET -SINGLE	S-5205	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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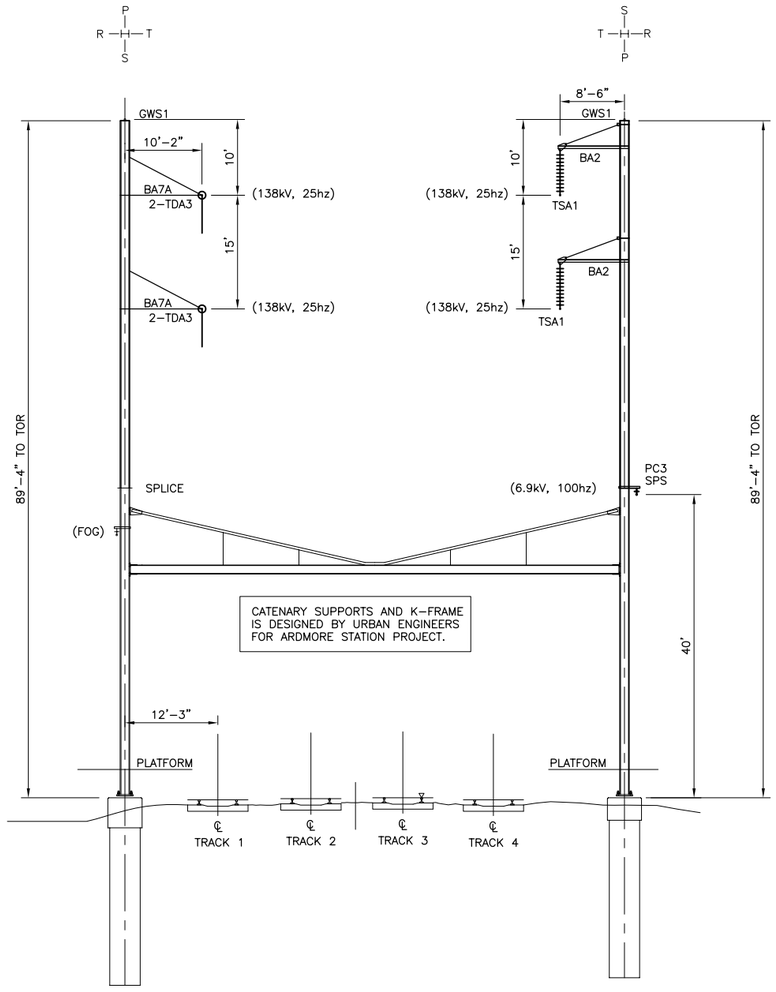
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-202

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1454.DWG
Ref. No.:	2011-059
Sheet No:	109 OF 347

ET-1454

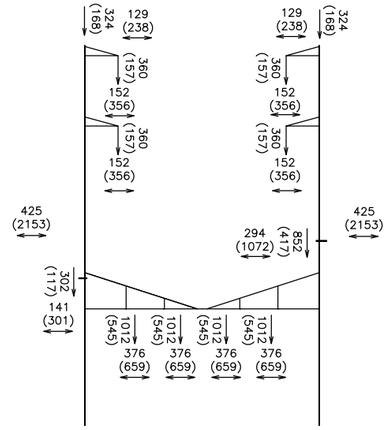
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STRUCTURE ERECTION DIAGRAM T-201

453+60
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
240' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION & SPLICE	S-5103	2
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA7A	TRANSMISSION BRACKET -SINGLE	S-5205	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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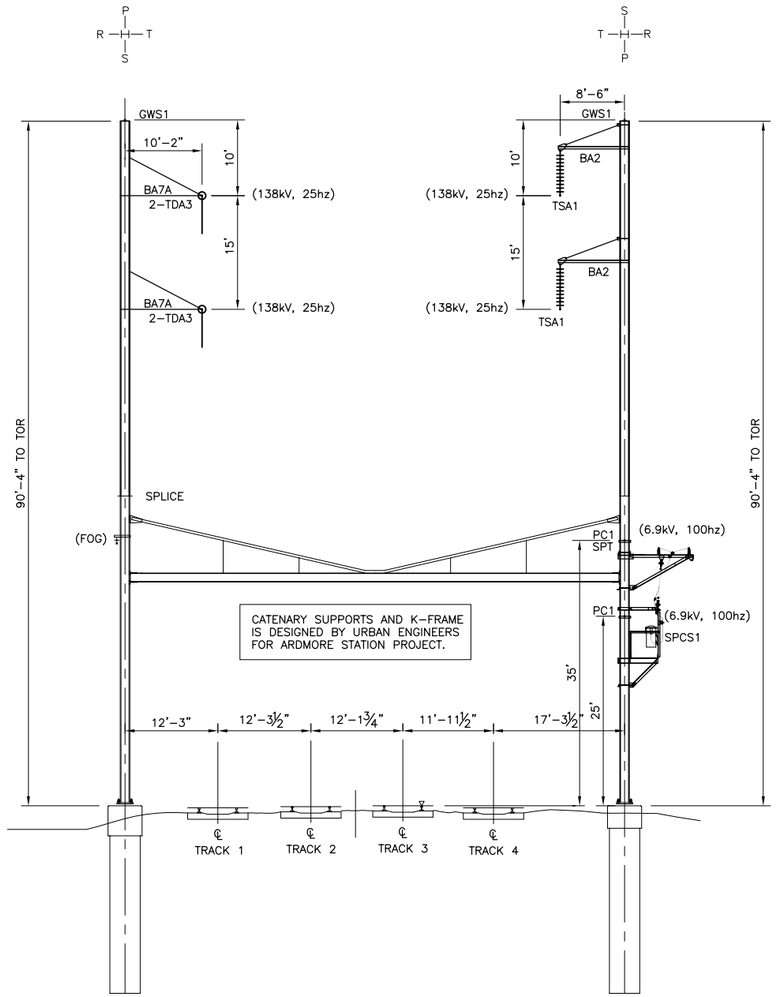
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-201

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1455.DWG
Ref. No.:	2011-059
Sheet No:	110 OF 347

ET-1455

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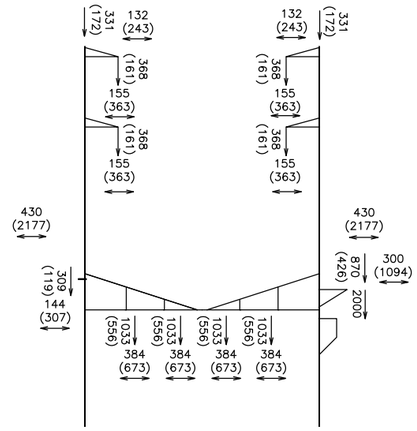
STRUCTURE ERECTION DIAGRAM T–200

451+16.5

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
245' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
PC1	SLIDING CLAMP	S–5214	2
P	POLE EXTENSION & SPLICE	S–5103	2
BA2	TRANSMISSION BRACKET –SINGLE	S–5201	2
BA7A	TRANSMISSION BRACKET –SINGLE	S–5205	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SIGNAL POWER CUT SECTION.

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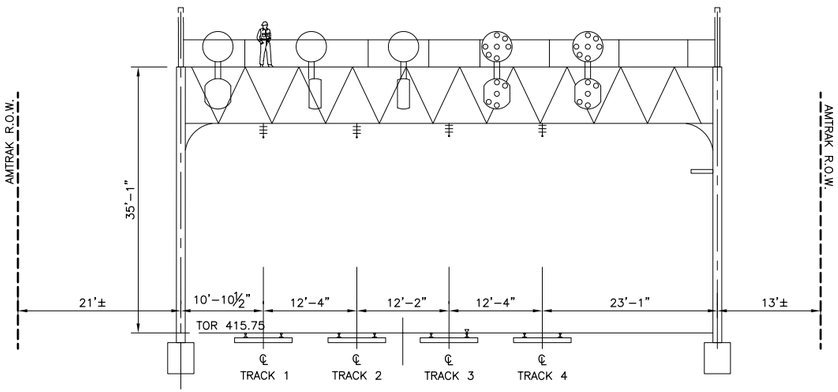
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–200

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1456.DWG
Ref. No.:	2011–059
Sheet No:	111 OF 347

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STRUCTURE ERECTION DIAGRAM T-199 SB (EXISTING P-64SB)

450+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

NOTE:

1. EXISTING SIGNAL BRIDGE P-64 SB AT ARDMORE STATION.

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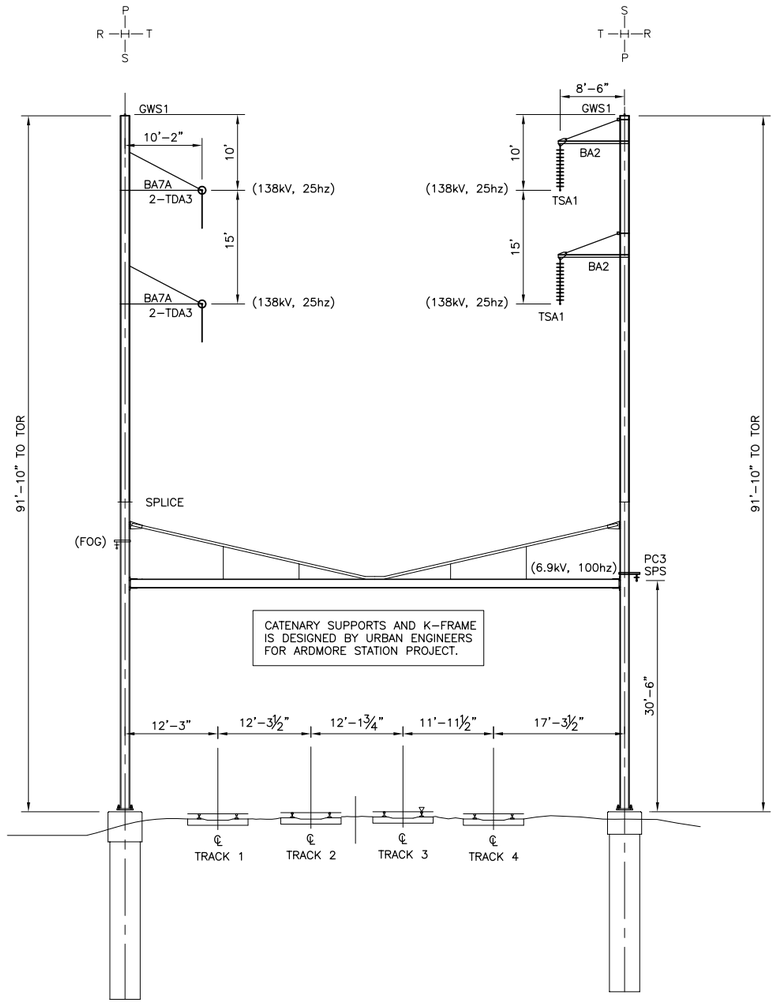
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-199 SB (EXISTING P-64 SB)

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1457.DWG
Ref. No.:	2011-059
Sheet No:	112 OF 347

ET-1457

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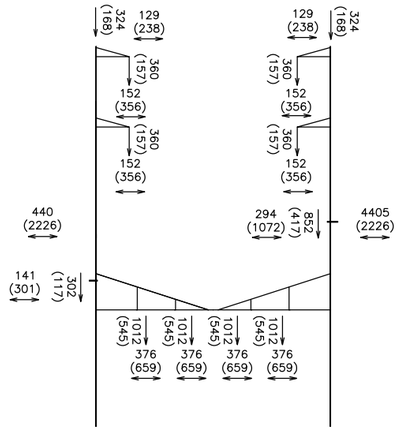
STRUCTURE ERECTION DIAGRAM T-198

448+73

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)

240' LOAD SPAN

(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION & SPLICE	S-5103	2
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA7A	TRANSMISSION BRACKET -SINGLE	S-5205	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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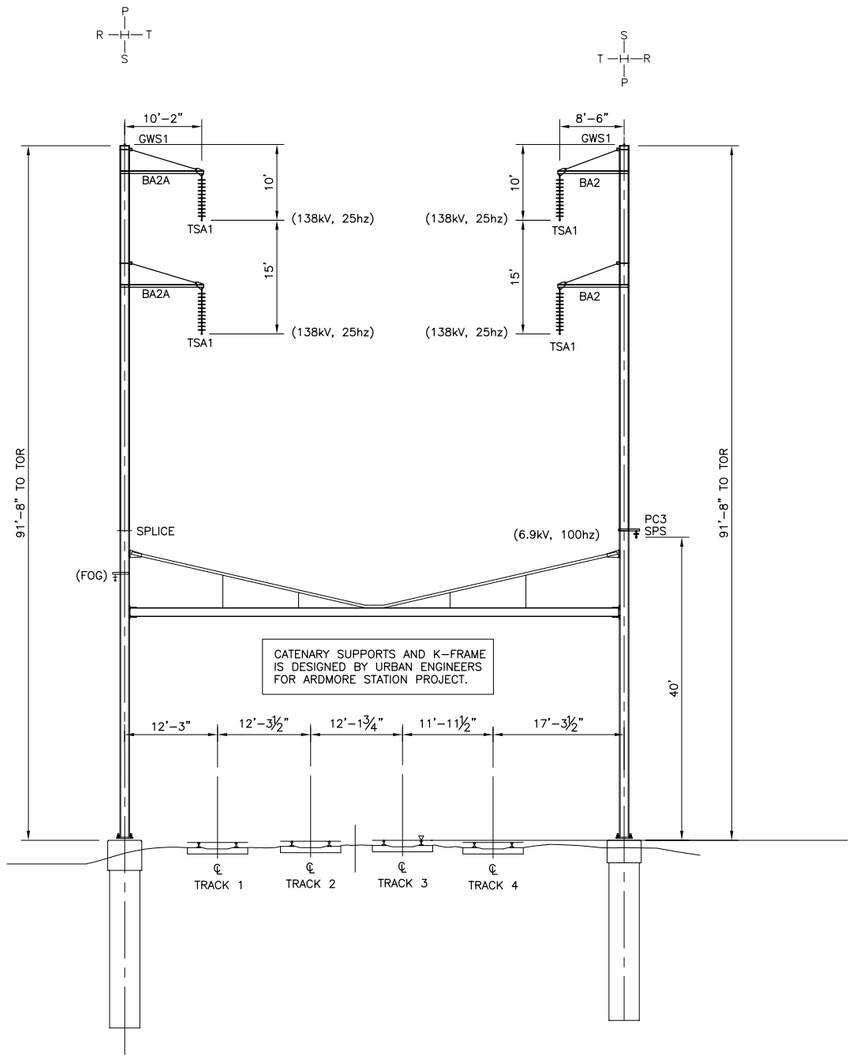
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-198

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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Ref. No.:	2011-059
Sheet No:	113 OF 347

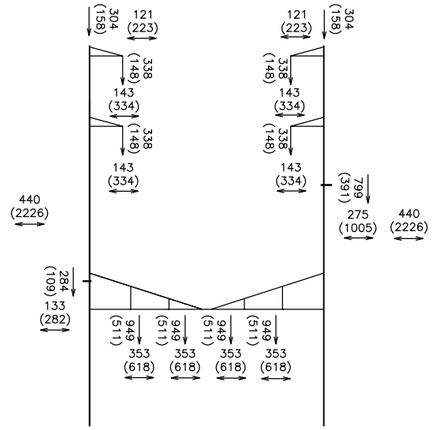
ET-1458



STRUCTURE ERECTION DIAGRAM T-197

446+48
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
225' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION & SPLICE	S-5103	2
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA2A	TRANSMISSION BRACKET -SINGLE	S-5201	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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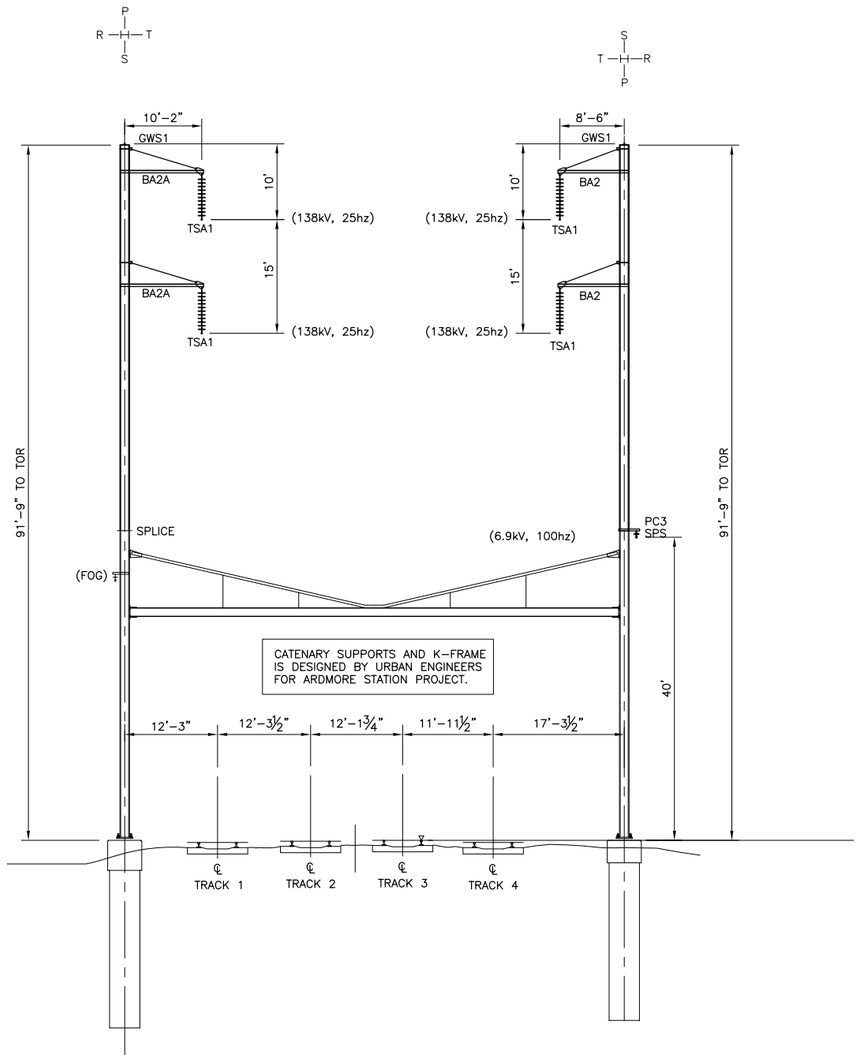
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-197

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1459.DWG
Ref. No.:	2011-059
Sheet No:	114 OF 347

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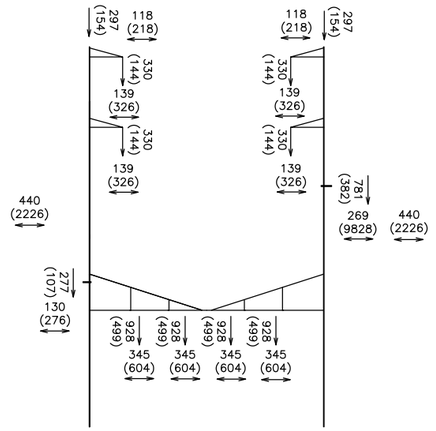
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STRUCTURE ERECTION DIAGRAM T-196

444+24
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
220' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION & SPLICE	S-5103	2
BA2	TRANSMISSION BRACKET -SINGLE	S-5201	2
BA2A	TRANSMISSION BRACKET -SINGLE	S-5201	2

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS AND TRANSMISSION BRACKETS.
2. INSTALL STATIC WIRE AND TRANSMISSION WIRES.
3. INSTALL SLIDING BRACKET AND SIGNAL POWER WIRE.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-196

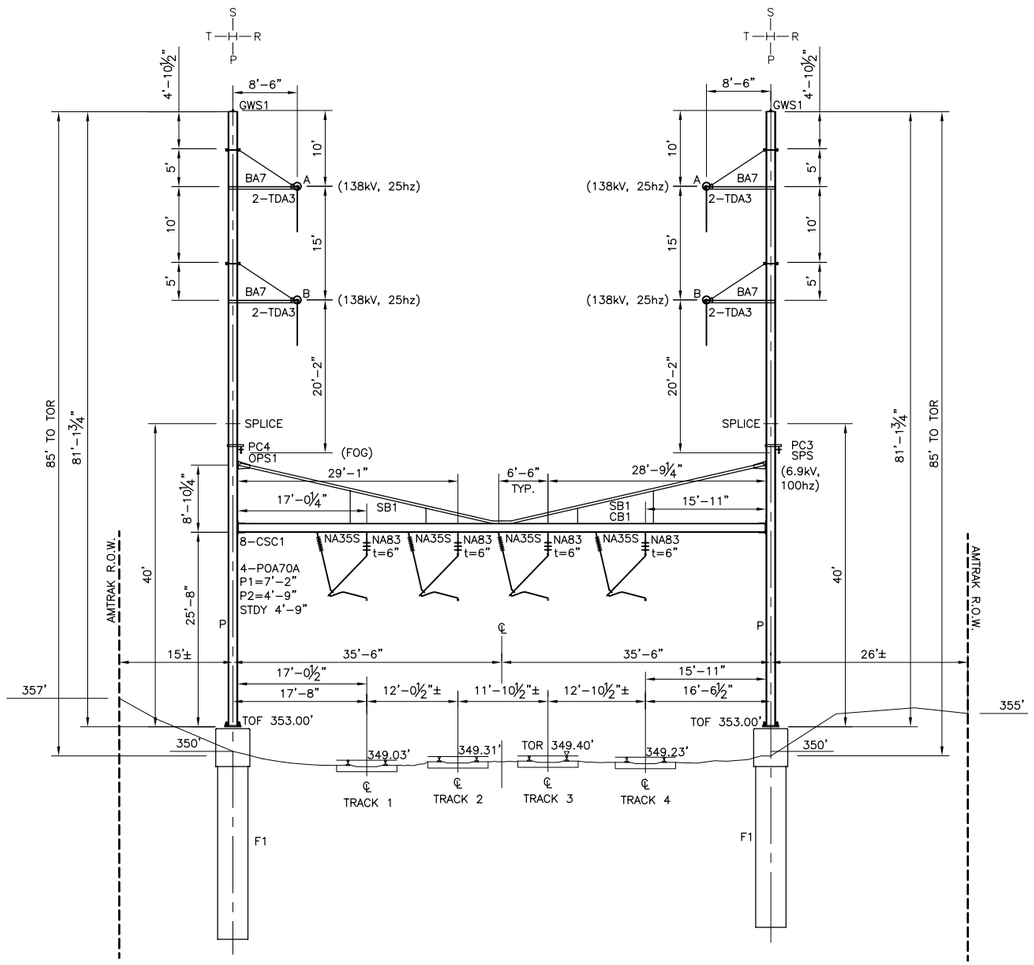
Recommended:	DP	Drawn:	VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1460.DWG
Ref. No.:	2011-059
Sheet No:	115 OF 347

ET-1460

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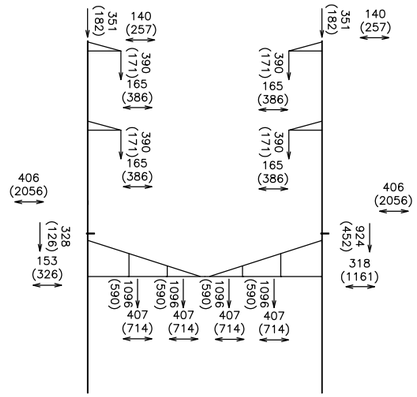
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'-7"	27'-1⅛"	27'-0¼"	27'-2⅛"
CW	21'-7"	21'-1⅛"	21'-0¼"	21'-2⅛"



STRUCTURE ERECTION DIAGRAM T-195

442+10
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA7	TRANSMISSION BRACKET - SINGLE	S-5205	4
CSC1	SLIDING CLAMP	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-195

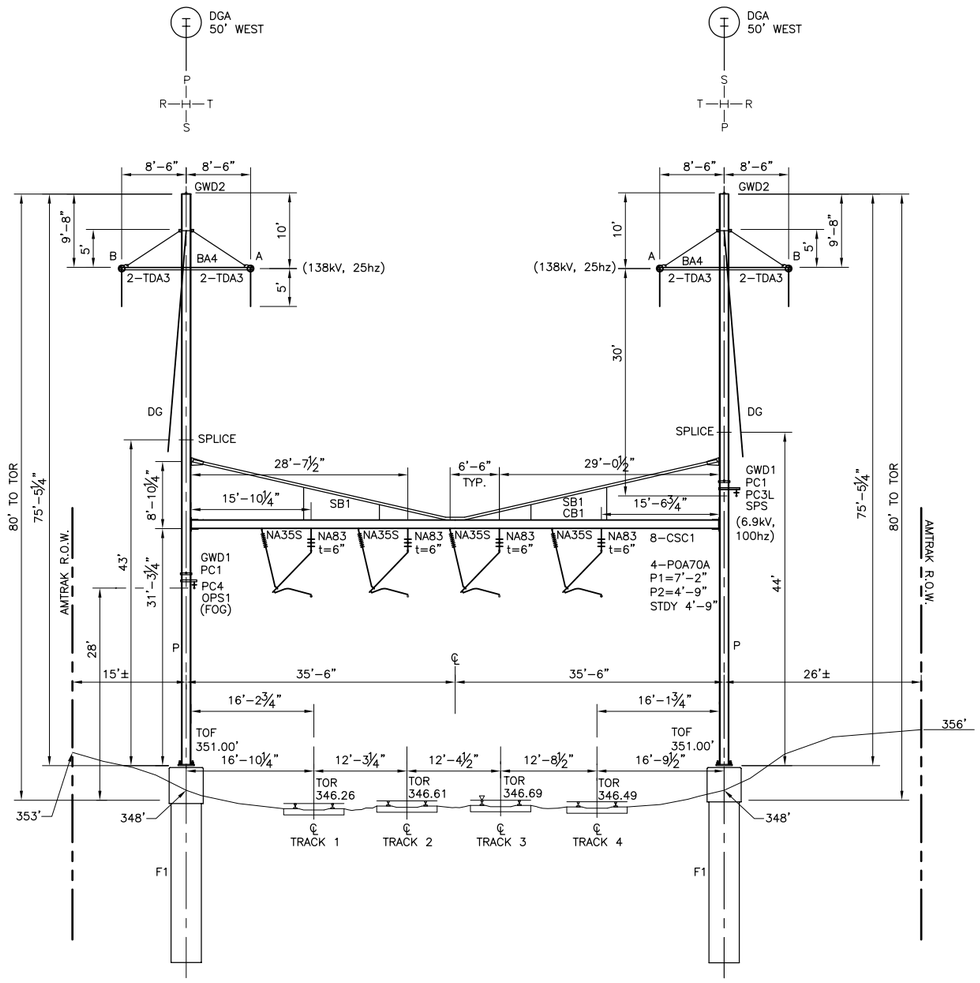
File No.:	2011-059-ET-1461.DWG
Ref. No.:	2011-059
Sheet No:	116 OF 347

ET-1461

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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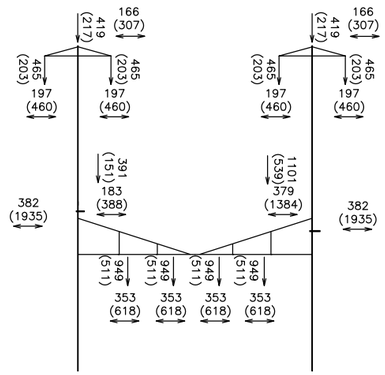
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	33'–4¼"	33'–0"	32'–11"	33'–1½"
CW	27'–4¼"	27'–0"	26'–11"	27'–1½"



STRUCTURE ERECTION DIAGRAM T–194

439+11
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
310' TRANSMISSION LOAD SPAN
225' CATENARY LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD1	GROUND WIRE DEADEND	ET–1909	2
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG	DOWNGUY	ET–1908	2
PC1	SLIDING CLAMP	S–5215	2
PC3L	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET –DOUBLE	S–5200	2
DGA	DOWNGUY ANCHOR	S–5101	2
CSC1	SLIDING CLAMP	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–194

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

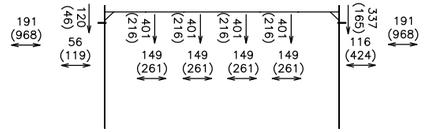
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Ref. No.:	2011–059
Sheet No:	117 OF 347

ET–1462

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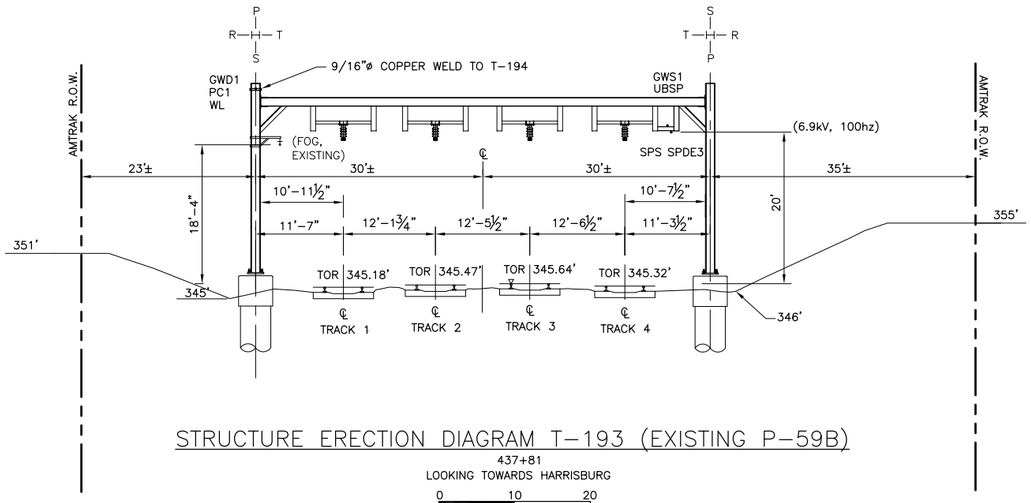
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET-1909	1
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEAD END	ET-1913	1
PC1	SLIDING CLAMP	S-5214	1
UBSP	SIGNAL POWER BRACKET	S-5240	1
–	9/16"ø CU-CLAD STEEL	ET-0093	450'

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	19'-4"	19'-0"	18'-9¾"	19'-3"
CW	18'-3¾"	18'-3¾"	18'-1¼"	18'-5¾"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
95' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-193 (EXISTING P-59B)

437+81
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL NEW SIGNAL POWER BRACKET.
2. INSTALL NEW GROUND WIRE AND NEW SIGNAL POWER WIRE.
3. SHIFT EXISTING SIGNAL POWER TO NEW BRACKET.

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-193 (EXISTING)

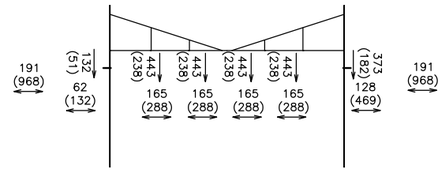
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1463.DWG
Ref. No.:	2011-059
Sheet No:	118 OF 347

ET-1463

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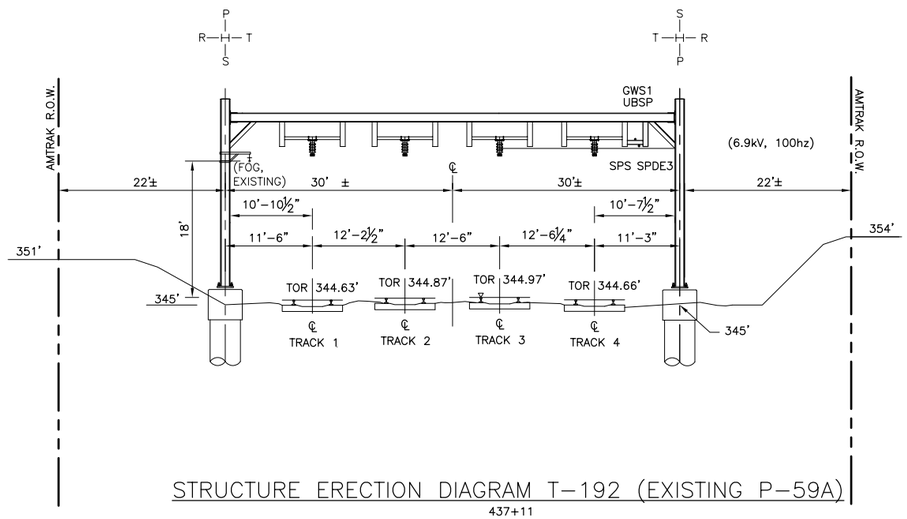
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEAD END	ET-1913	1
UBSP	SIGNAL POWER BRACKET	S-5240	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
105' LOAD SPAN
(NOT TO SCALE)

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	19'-3¼"	19'-3½"	19'-2"	19'-5"
CW	18'-1"	18'-3¼"	18'-0"	18'-6¼"



STRUCTURE ERECTION DIAGRAM T-192 (EXISTING P-59A)

437+11
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL NEW SIGNAL POWER BRACKET.
2. INSTALL NEW GROUND WIRE AND NEW SIGNAL POWER WIRE.
3. SHIFT EXISTING SIGNAL POWER TO NEW BRACKET.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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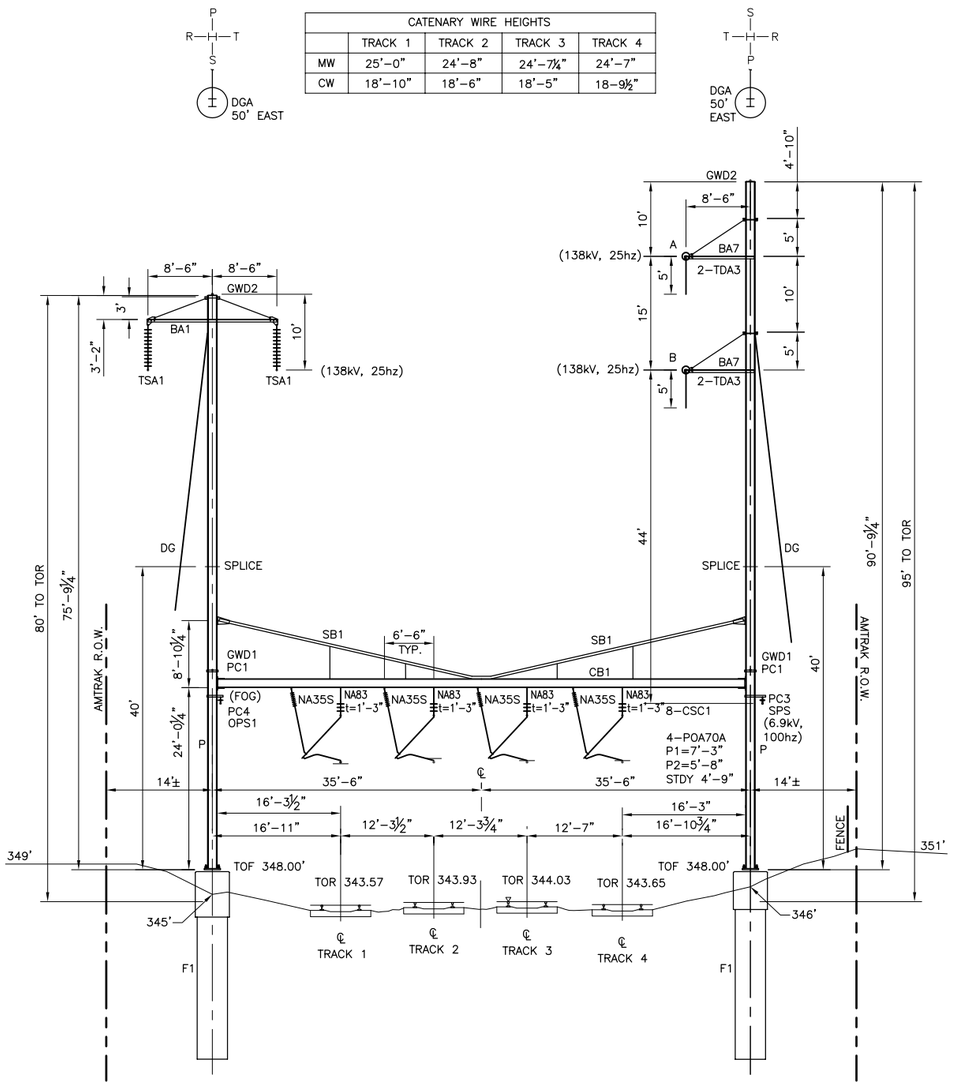
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-192 (EXISTING)

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1464.DWG
Ref. No.:	2011-059
Sheet No:	119 OF 347

ET-1464

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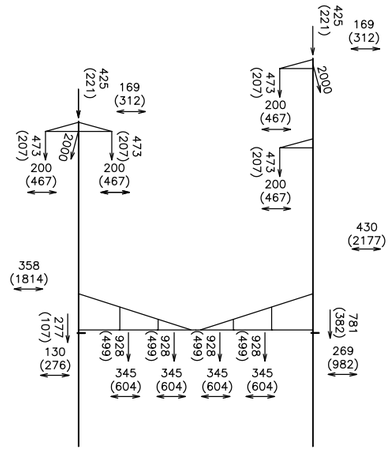


CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'-0"	24'-8"	24'-7¼"	24'-7"
CW	18'-10"	18'-6"	18'-5"	18-9½"

STRUCTURE ERECTION DIAGRAM T-191

435+90
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
315' TRANSMISSION SPAN
220' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWD1	GROUND WIRE DEADEND	ET-1909	2
GWD2	GROUND WIRE DEADEND	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
DG	DOWN GUY	ET-1908	2
PC1	SLIDING CLAMP	S-5215	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET	S-5200	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING CLAMP	S-5214	8
DGA	DOWN GUY ANCHOR	S-5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station-Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-191

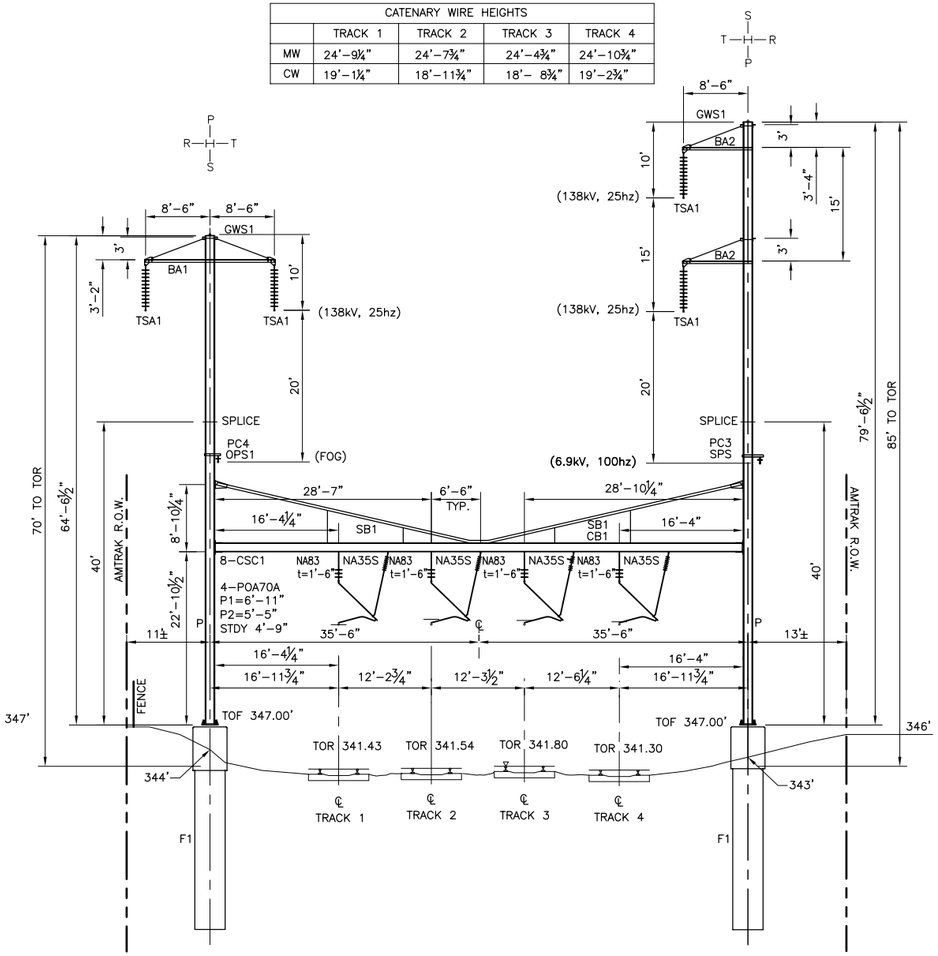
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Ref. No.:	2011-059
Sheet No:	120 OF 347

ET-1465

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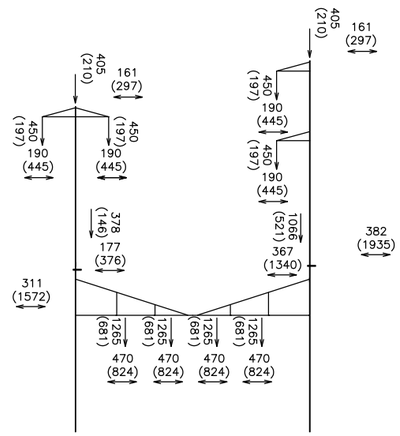
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–9¾"	24'–7¾"	24'–4¾"	24'–10¾"
CW	19'–1¼"	18'–11¾"	18'– 8¾"	19'–2¾"



STRUCTURE ERECTION DIAGRAM T–190

432+86
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	1
BA2	TRANSMISSION BRACKET	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–190

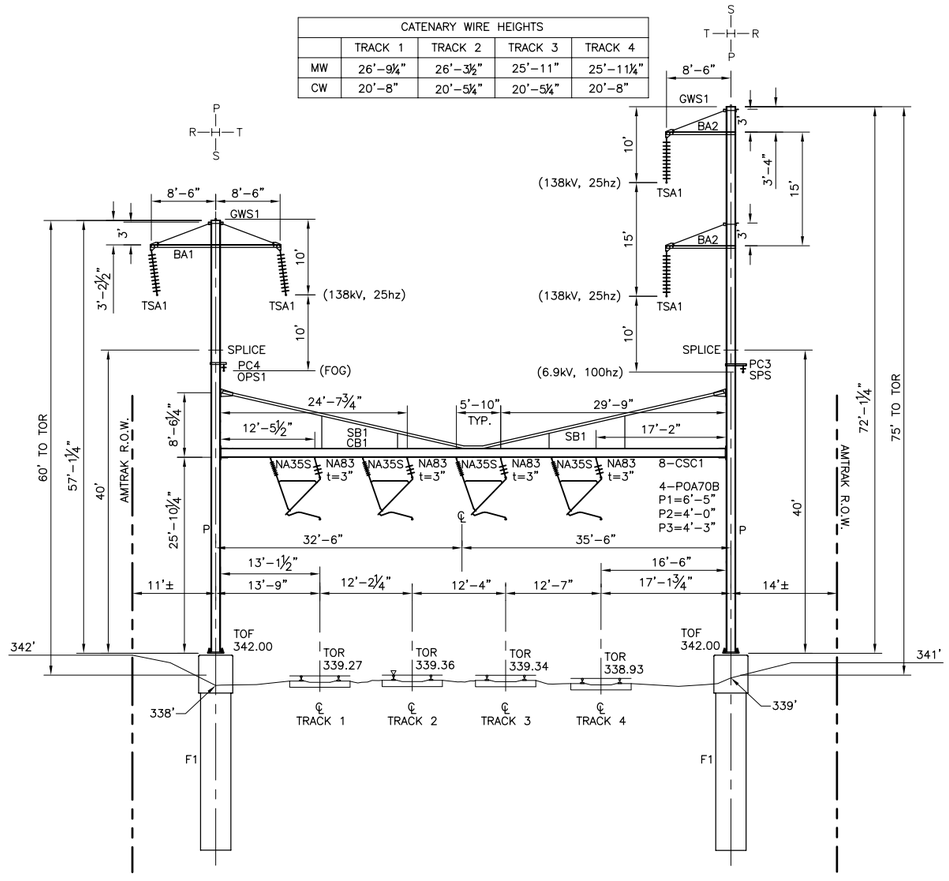
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Ref. No.:	2011–059
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ET–1466

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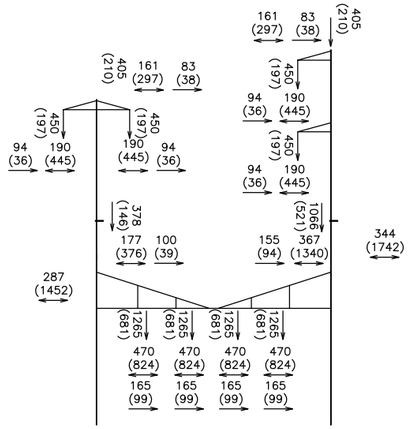
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–9¼"	26'–3½"	25'–11"	25'–11¼"
CW	20'–8"	20'–5¼"	20'–5¼"	20'–8"



STRUCTURE ERECTION DIAGRAM T–189

429+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70B	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	1
BA2	TRANSMISSION BRACKET	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–189

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

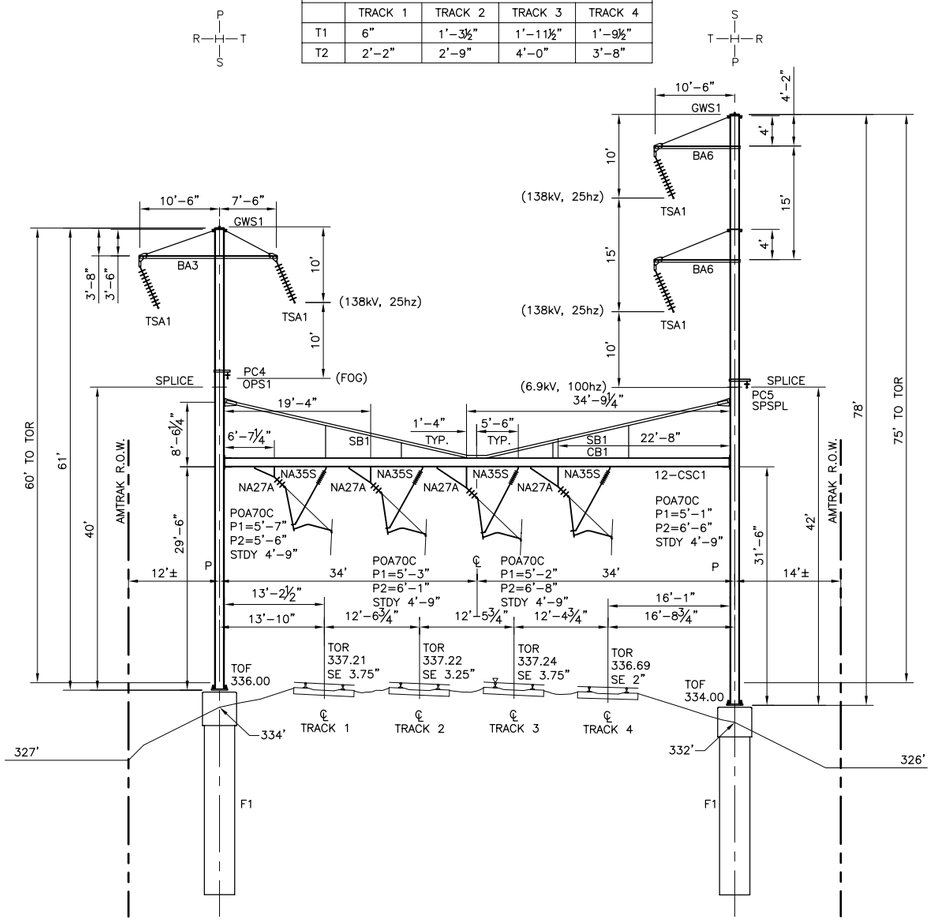
File No.:	2011–059–ET–1467.DWG
Ref. No.:	2011–059
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ET–1467

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–10¾"	25'–1¼"	24'–5"	25'–1½"
CW	19'–10¾"	19'–5"	18'–9¼"	19'–7"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	6"	1'–3½"	1'–11½"	1'–9½"
T2	2'–2"	2'–9"	4'–0"	3'–8"



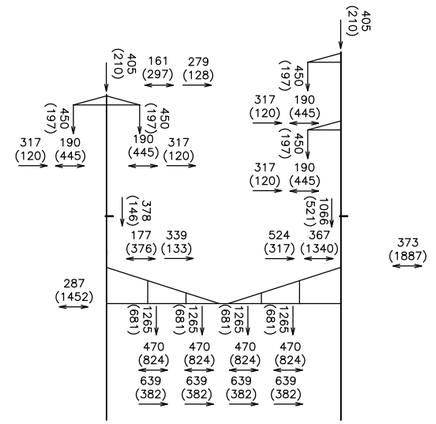
STRUCTURE ERECTION DIAGRAM T–188

426+84

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–188

File No.:	2011–059–ET–1468.DWG
Ref. No.:	2011–059
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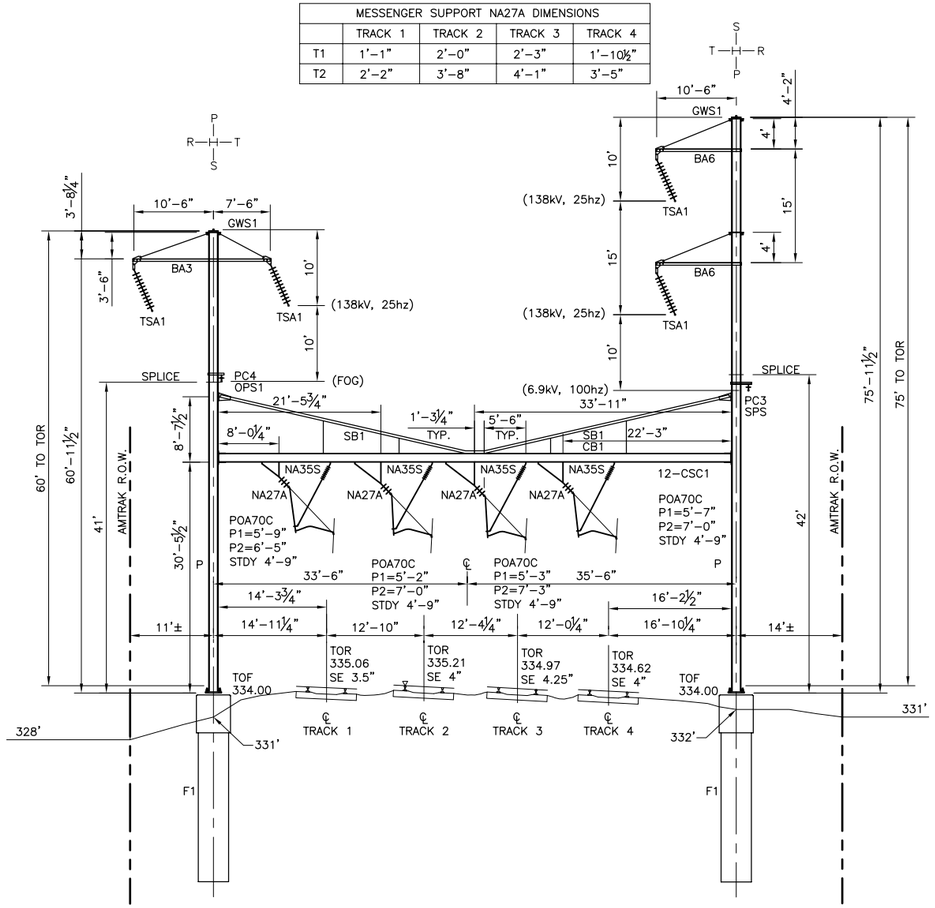
ET–1468

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–4½"	25'–3¾"	25'–3¾"	26'–0½"
CW	20'–2"	19'–7¾"	19'–7"	20'–0"

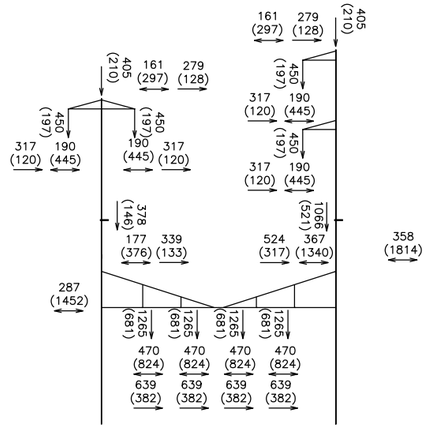
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–1"	2'–0"	2'–3"	1'–10½"
T2	2'–2"	3'–8"	4'–1"	3'–5"



STRUCTURE ERECTION DIAGRAM T–187

423+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–187

File No.:	2011–059–ET–1469.DWG
Ref. No.:	2011–059
Sheet No:	124 OF 347

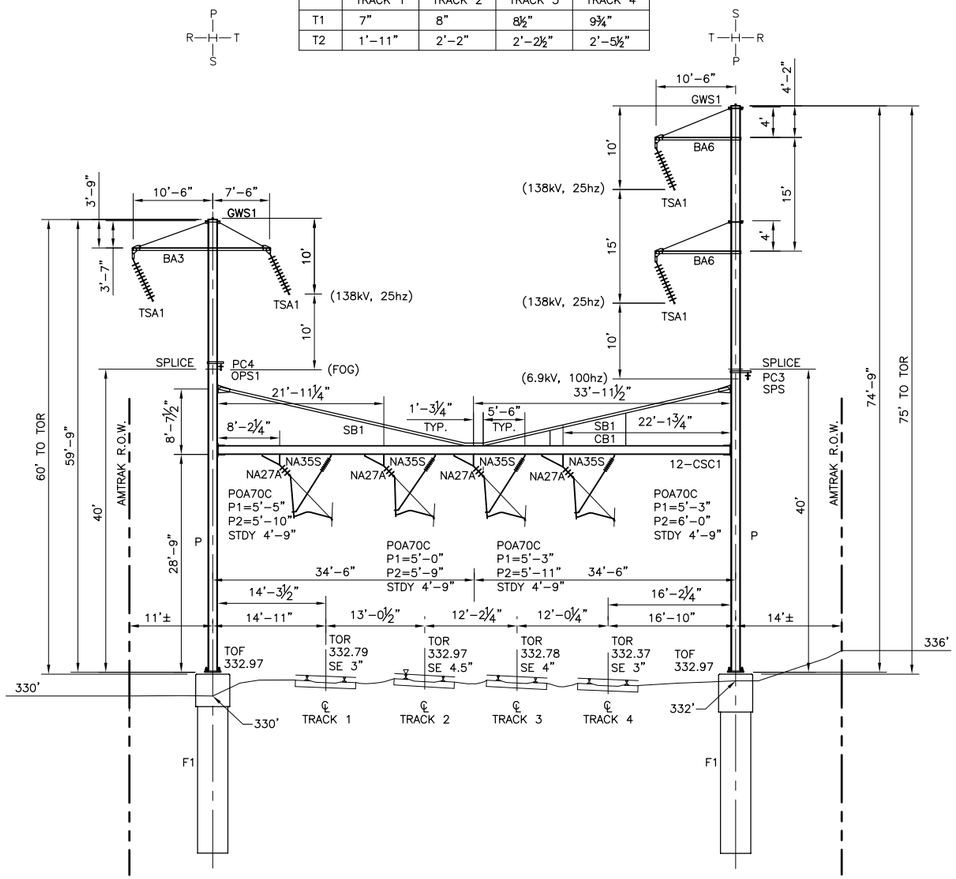
ET–1469

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-5½"	26'-1¾"	26'-3¾"	26'-7½"
CW	20'-7"	20'-7"	20'-6¼"	20'-10½"

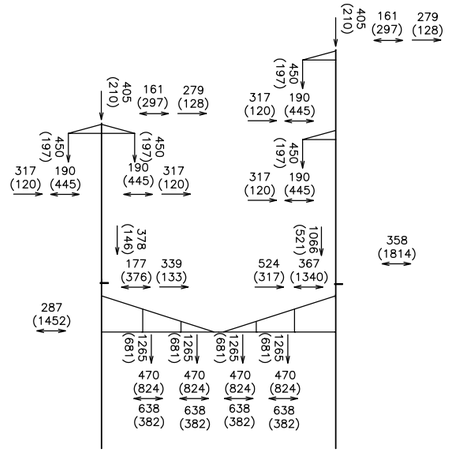
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	7"	8"	8½"	9¾"
T2	1'-11"	2'-2"	2'-2½"	2'-5½"



STRUCTURE ERECTION DIAGRAM T–186

420+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–186

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

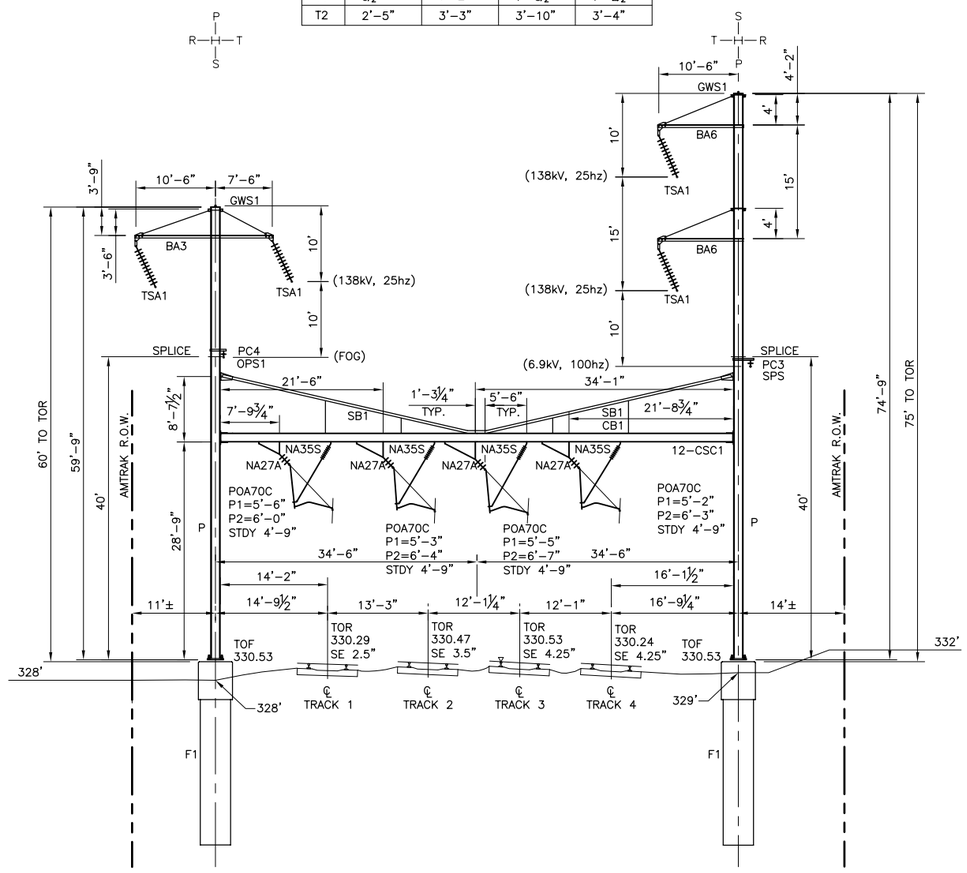
File No.:	2011–059–ET–1470.DWG
Ref. No.:	2011–059
Sheet No:	125 OF 347

ET–1470

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–3½"	25'–8¼"	25'–4½"	25'–10¾"
CW	20'–3¼"	19'–10¾"	19'–5½"	20'–2¾"

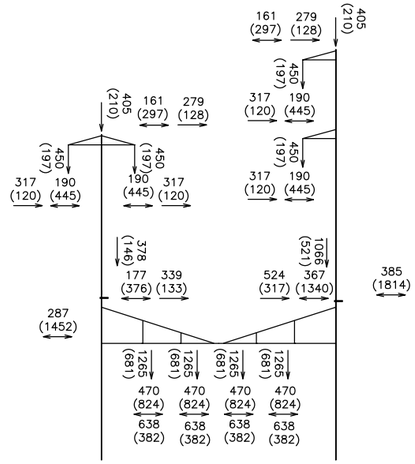
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	9½"	1'–2"	1'–5½"	1'–2½"
T2	2'–5"	3'–3"	3'–10"	3'–4"



STRUCTURE ERECTION DIAGRAM T–185

417+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–185

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

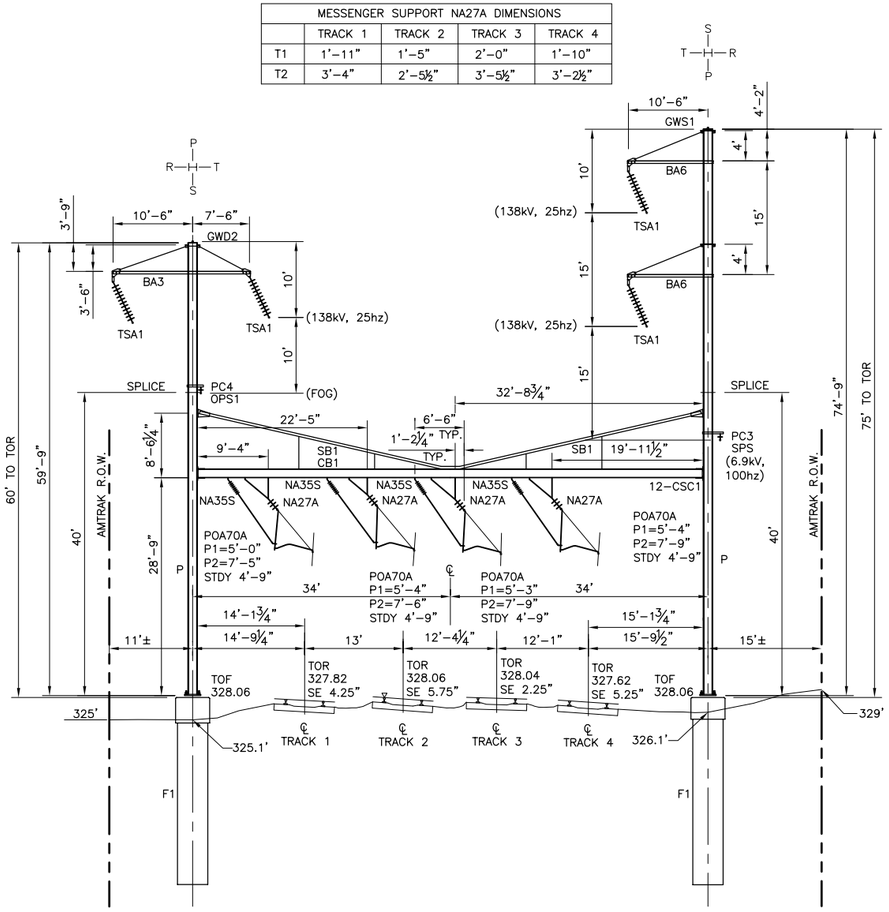
File No.:	2011–059–ET–1471.DWG
Ref. No.:	2011–059
Sheet No:	126 OF 347

ET–1471

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3/14/2016
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–0½"	25'–4¼"	24'–9"	25'–4"
CW	19'–5½"	19'–4¾"	18'–11½"	19'–5¼"

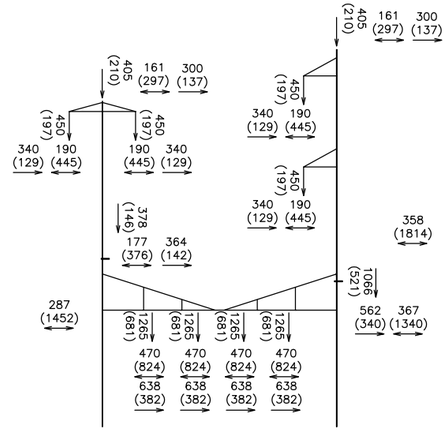
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–11"	1'–5"	2'–0"	1'–10"
T2	3'–4"	2'–5½"	3'–5½"	3'–2½"



STRUCTURE ERECTION DIAGRAM T–184

414+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	2
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–184

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Ref. No.:	2011–059
Sheet No:	127 OF 347

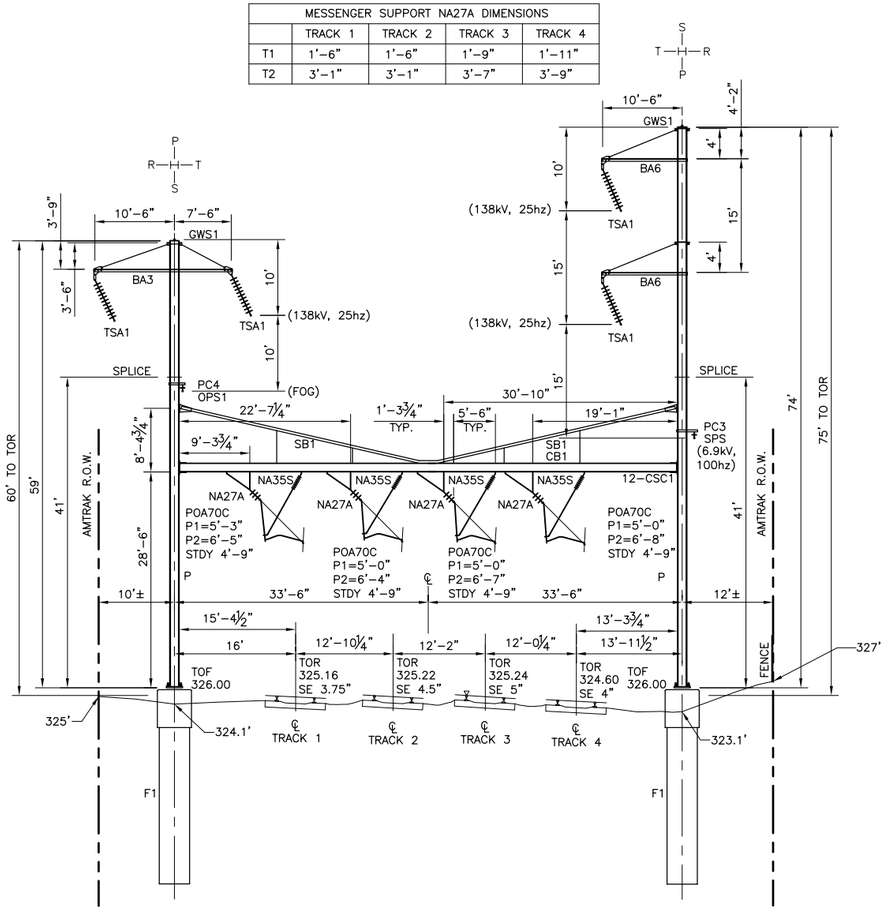
ET–1472

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

4:23:01 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1472.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25–11	25'–10"	25'–6¾"	26'–1"
CW	20'–2¼"	20'–4"	20'–1"	20'–6¾"

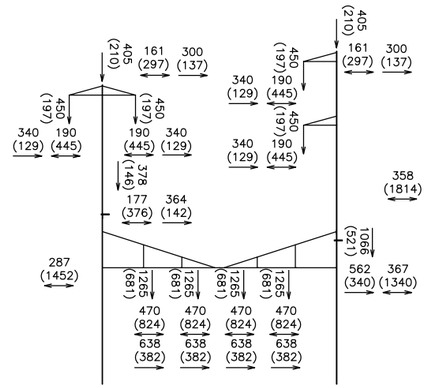
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–6"	1'–6"	1'–9"	1'–11"
T2	3'–1"	3'–1"	3'–7"	3'–9"



STRUCTURE ERECTION DIAGRAM T–183

411+84
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSUALTOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA6	TRANSMISSION BRACKET	S–5204	2
CSC1	SLIDING BEAM CLAMP	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–183

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

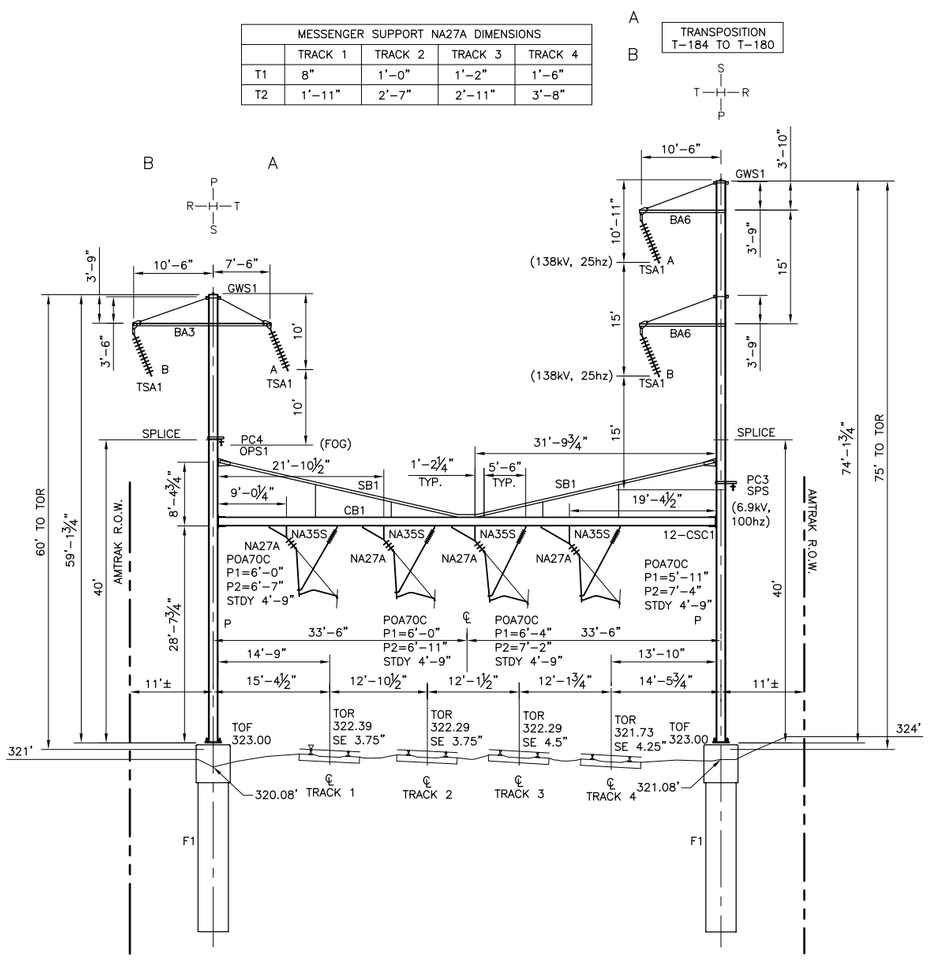
File No.:	2011–059–ET–1473.DWG
Ref. No.:	2011–059
Sheet No:	128 OF 347

ET–1473

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–6¾"	26'–4¼"	26'–2½"	26'–4½"
CW	20'–0¾"	19'–9½"	19'–4"	19'–11"

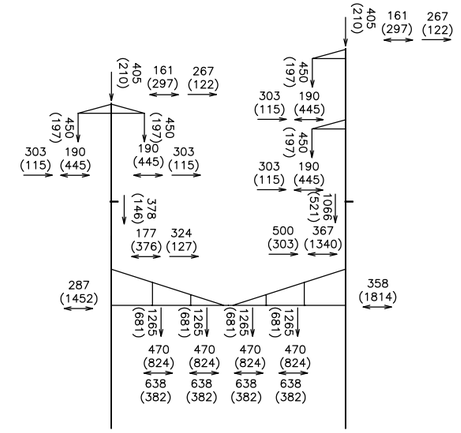
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	1'–0"	1'–2"	1'–6"
T2	1'–11"	2'–7"	2'–11"	3'–8"



STRUCTURE ERECTION DIAGRAM T–182

408+84
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET – DOUBLE	S–5202	1
BA6	TRANSMISSION BRACKET – SINGLE	S–5204	2
CSC1	SLIDING BEAM CLAMP	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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30TH Street Station–Philadelphia, Pennsylvania 19104

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–182

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1474.DWG
Ref. No.:	2011–059
Sheet No:	129 OF 347

ET–1474

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–6¾"	27'–7¼"	27'–4½"	28'–0½"
CW	21'–11½"	22'–1"	21'–3½"	21'–11¼"

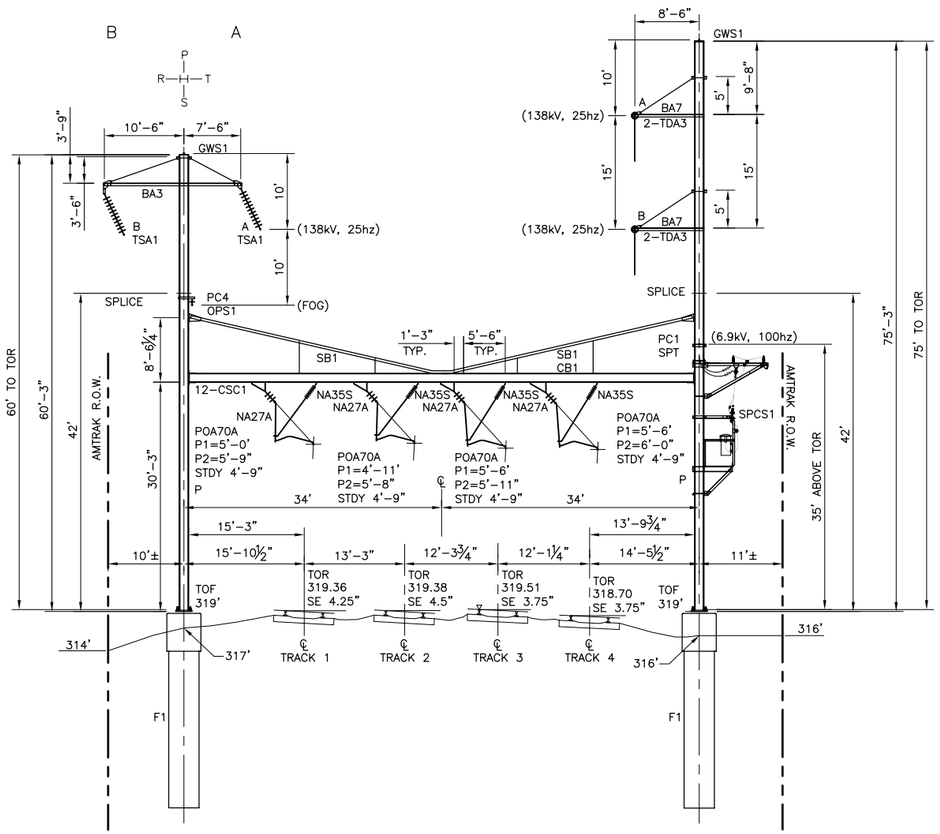
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	5"	4"	5"	7"
T2	1'–4½"	1'–4"	1'–4½"	1'–8"

A

B

TRANSPOSITION
T–184 TO T–180

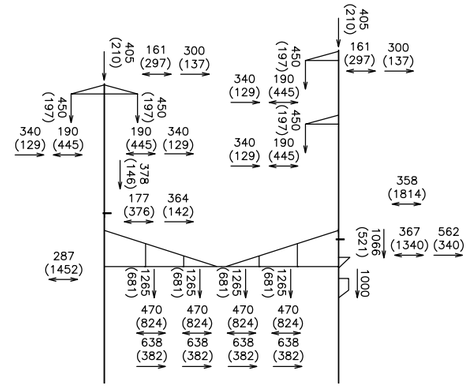




STRUCTURE ERECTION DIAGRAM T–181

405+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
POA70C	REGISTRATION ASSEMBLY	ET–1902	4
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET –DOUBLE	S–5202	1
BA7	TRANSMISSION BRACKET –SINGLE	S–5205	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–181

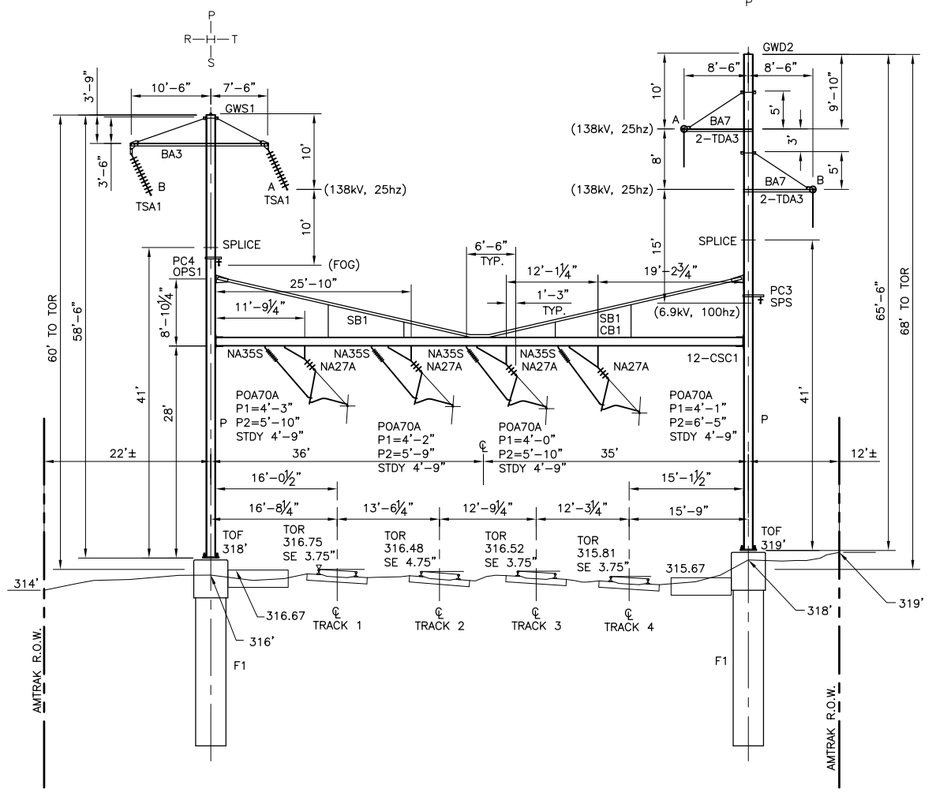
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1475.DWG
Ref. No.:	2011–059
Sheet No:	130 OF 347

ET–1475

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-4¾"	26'-5¼"	25'-8"	26'-2¾"
CW	21'-7"	21'-9¼"	20'-4"	21'-7"

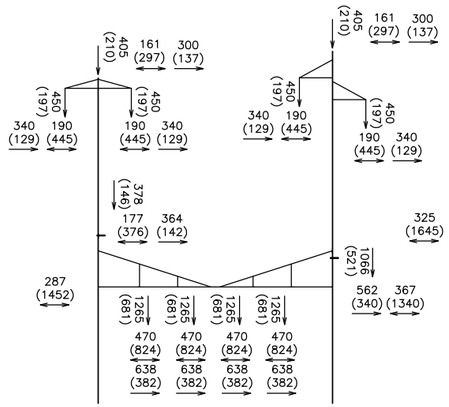
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	11"	1'-1½"	1'-7"	2'-0"
T2	2'-5"	2'-10"	3'-10"	3'-11"



STRUCTURE ERECTION DIAGRAM T-180

403+04
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
GWD2	GROUND WIRE DEADEND	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA3	TRANSMISSION BRACKET	S-5202	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-180

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

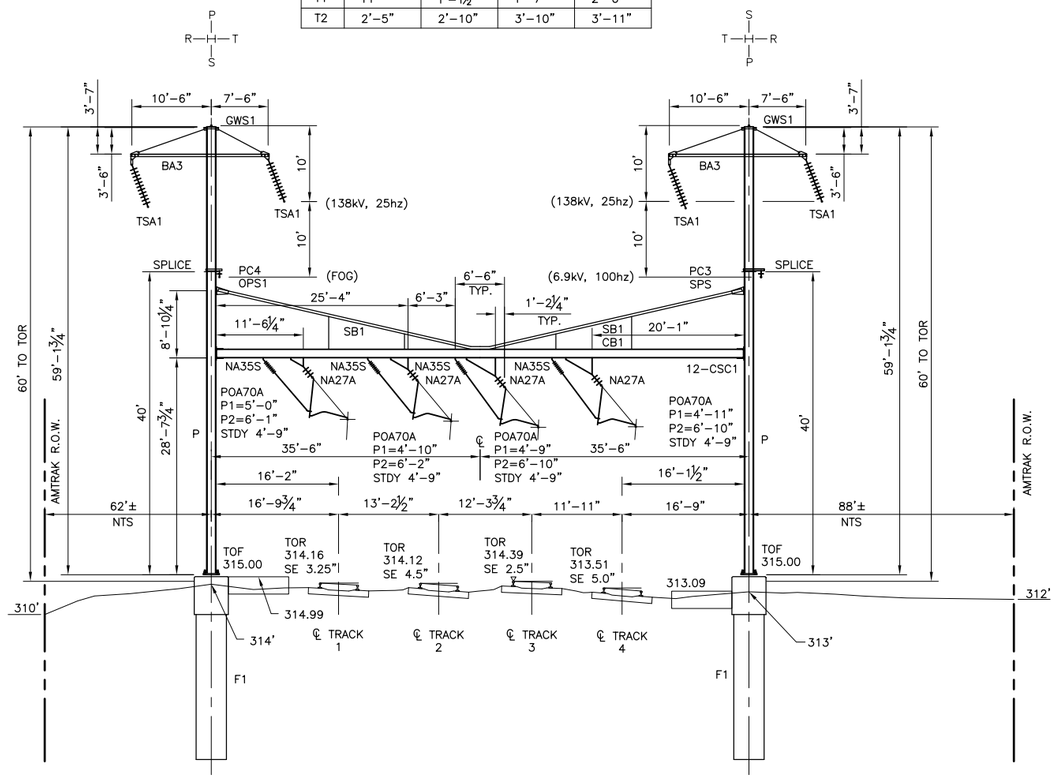
File No.:	2011-059-ET-1476.DWG
Ref. No.:	2011-059
Sheet No:	131 OF 347

ET-1476

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–1¾"	26'–10"	25'–8"	26'–9"
CW	21'–7¼"	21'–5"	20'–4"	21'–3½"

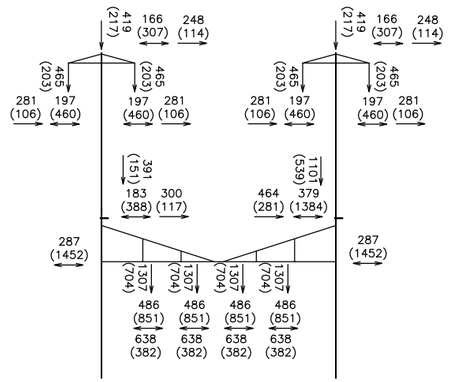
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	11"	1'–1½"	1'–7"	2'–0"
T2	2'–5"	2'–10"	3'–10"	3'–11"



STRUCTURE ERECTION DIAGRAM T–179

399+95
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
310' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET – DOUBLE	S–5202	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–179

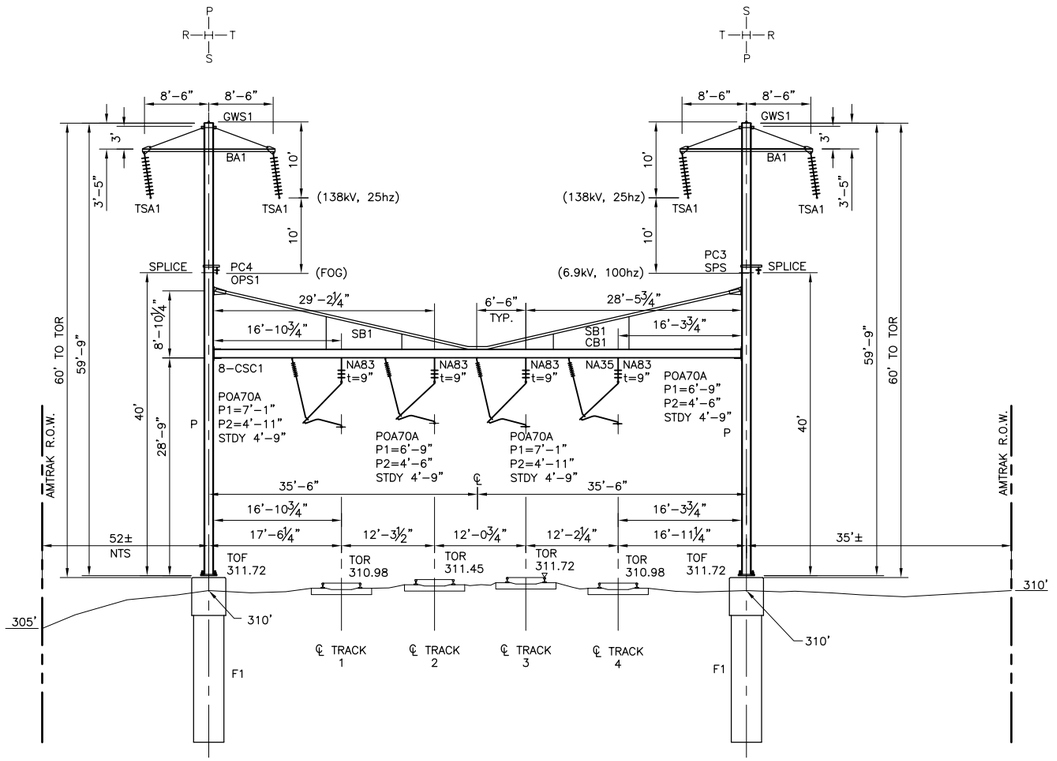
File No.:	2011–059–ET–1477.DWG
Ref. No.:	2011–059
Sheet No:	132 OF 347

ET–1477

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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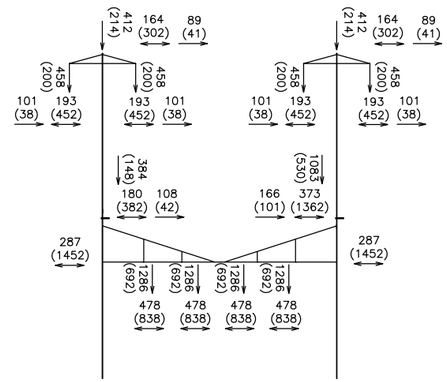
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-7"	26'-1¼"	25'-10"	26'-7"
CW	20'-7½"	20'-7¾"	19'-11¼"	21'-0¾"



STRUCTURE ERECTION DIAGRAM T-178

396+84
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
305' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET - DOUBLE	S-5200	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-178

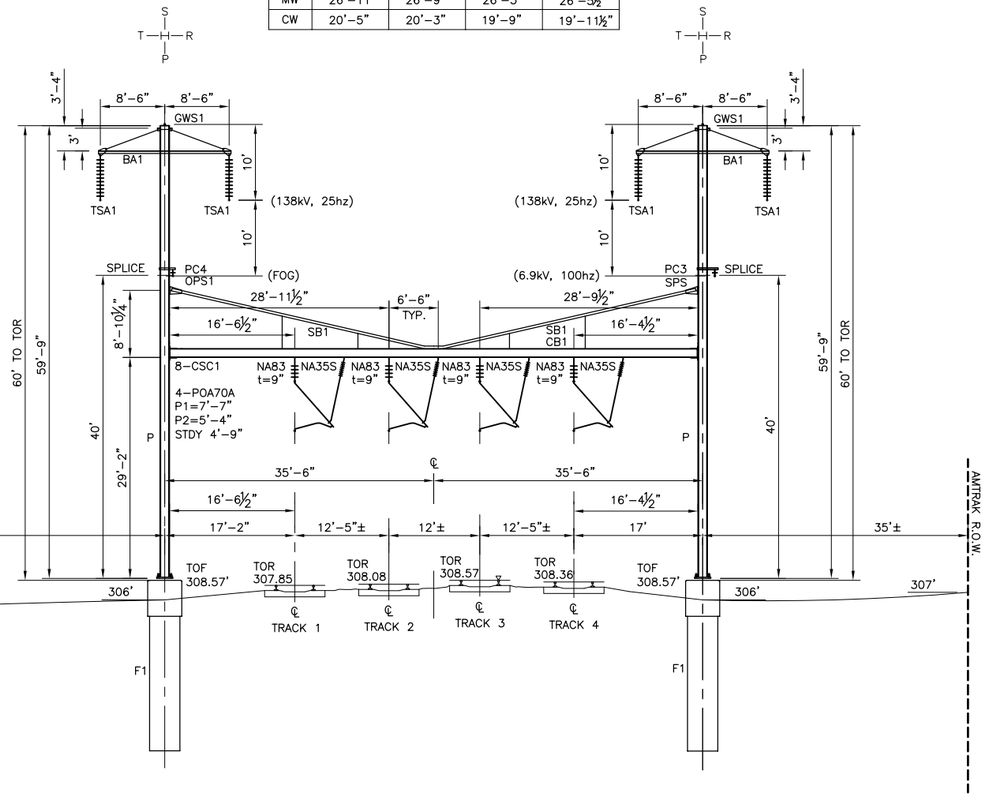
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1478.DWG
Ref. No.:	2011-059
Sheet No:	133 OF 347

ET-1478

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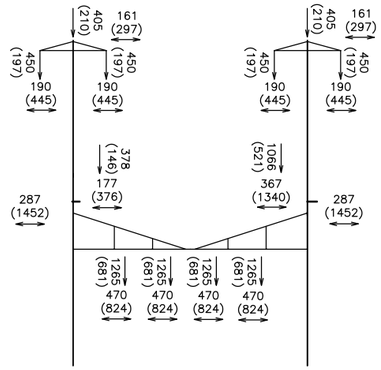
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–11"	26'–9"	26'–3"	26'–5½"
CW	20'–5"	20'–3"	19'–9"	19'–11½"



STRUCTURE ERECTION DIAGRAM T–177

393+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

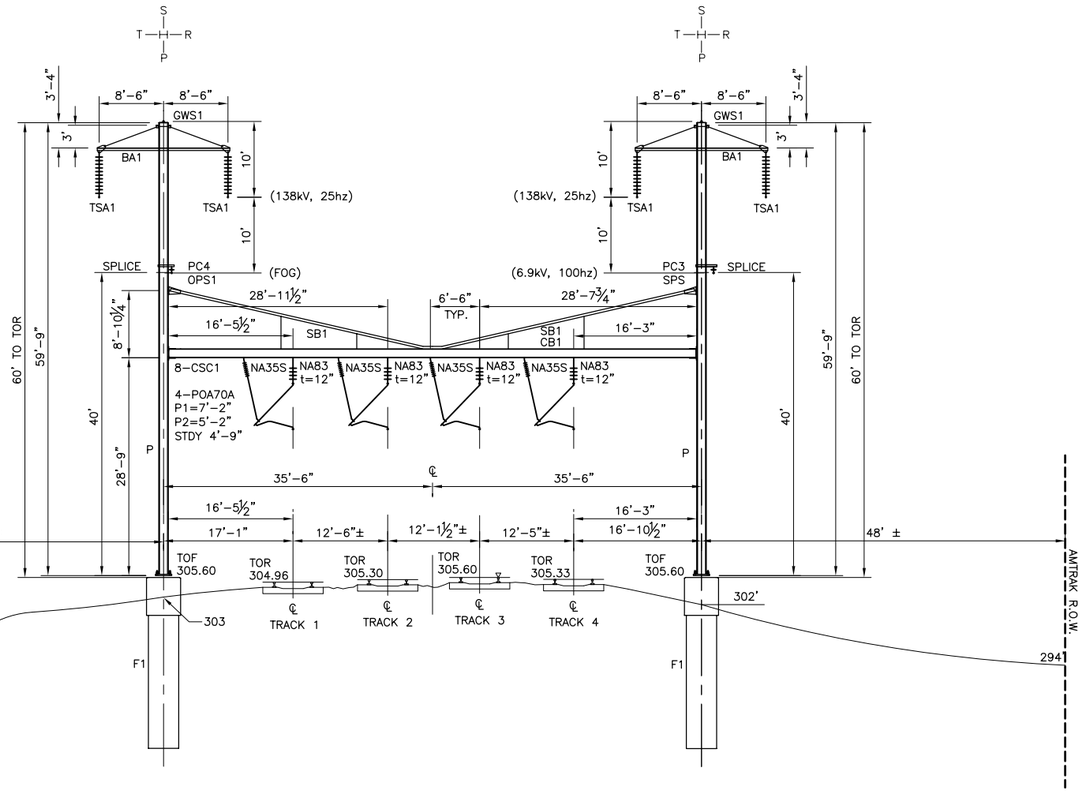
STRUCTURAL ERECTION DIAGRAM
T–177

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1479.DWG
Ref. No.:	2011–059
Sheet No:	134 OF 347

ET–1479

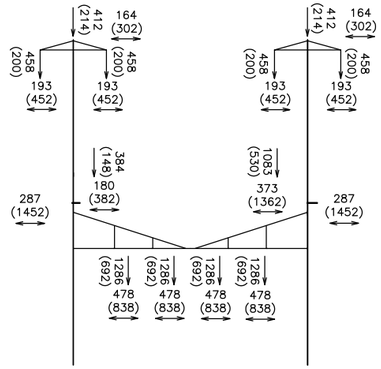
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–2½"	25'–10½"	25'–7"	25'–10"
CW	20'–2½"	19'–10½"	19'–7"	19'–10"



STRUCTURE ERECTION DIAGRAM T–176

390+85
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
305' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–176

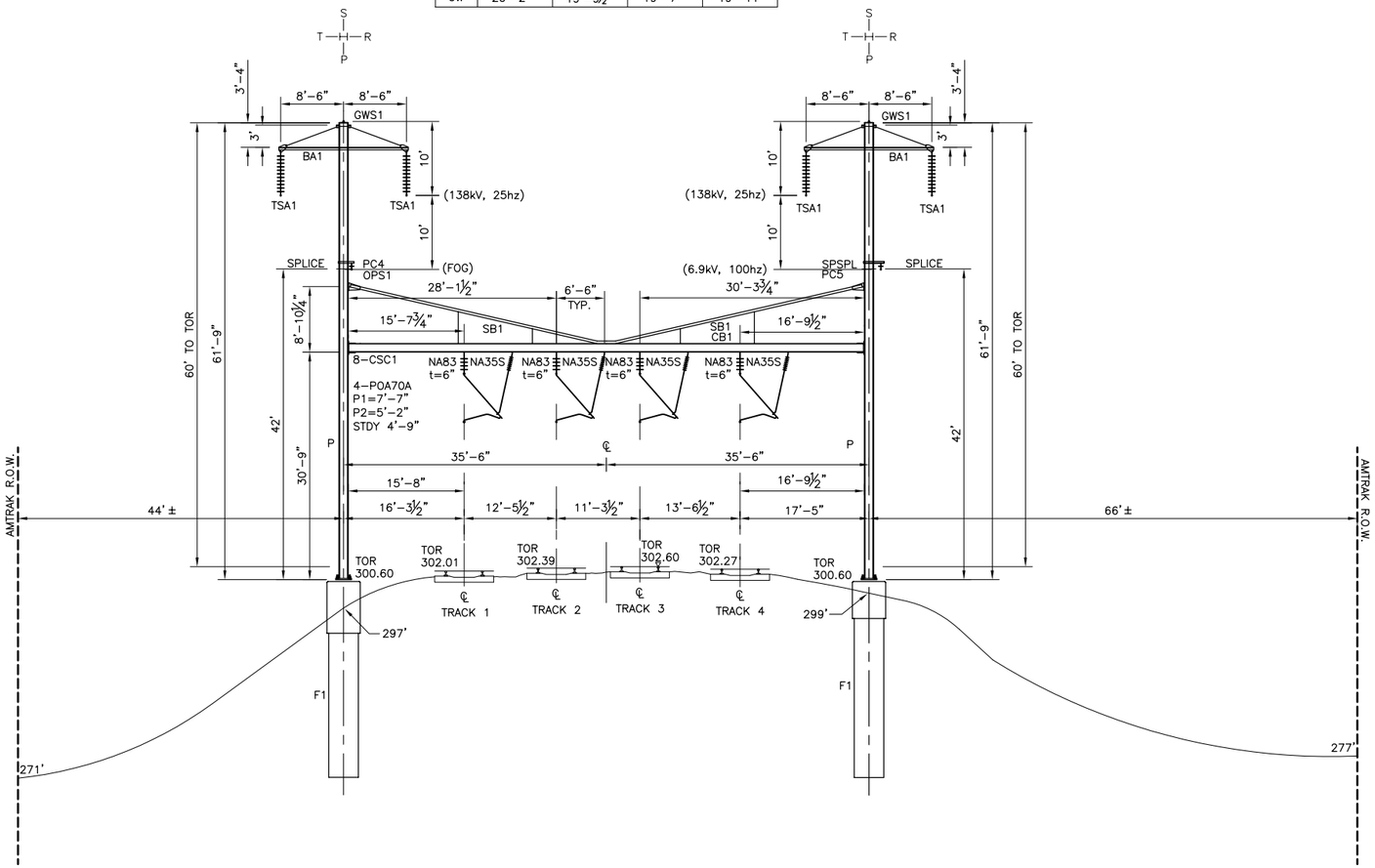
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File No.:	2011–059–ET–1480.DWG
Ref. No.:	2011–059
Sheet No:	135 OF 347

ET–1480

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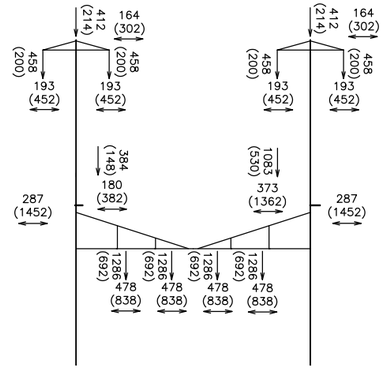
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–8"	26'–3½"	26'–1"	26'–5"
CW	20'–2"	19'–9½"	19'–7"	19'–11"



STRUCTURE ERECTION DIAGRAM T–175

387+76
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
305' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–175

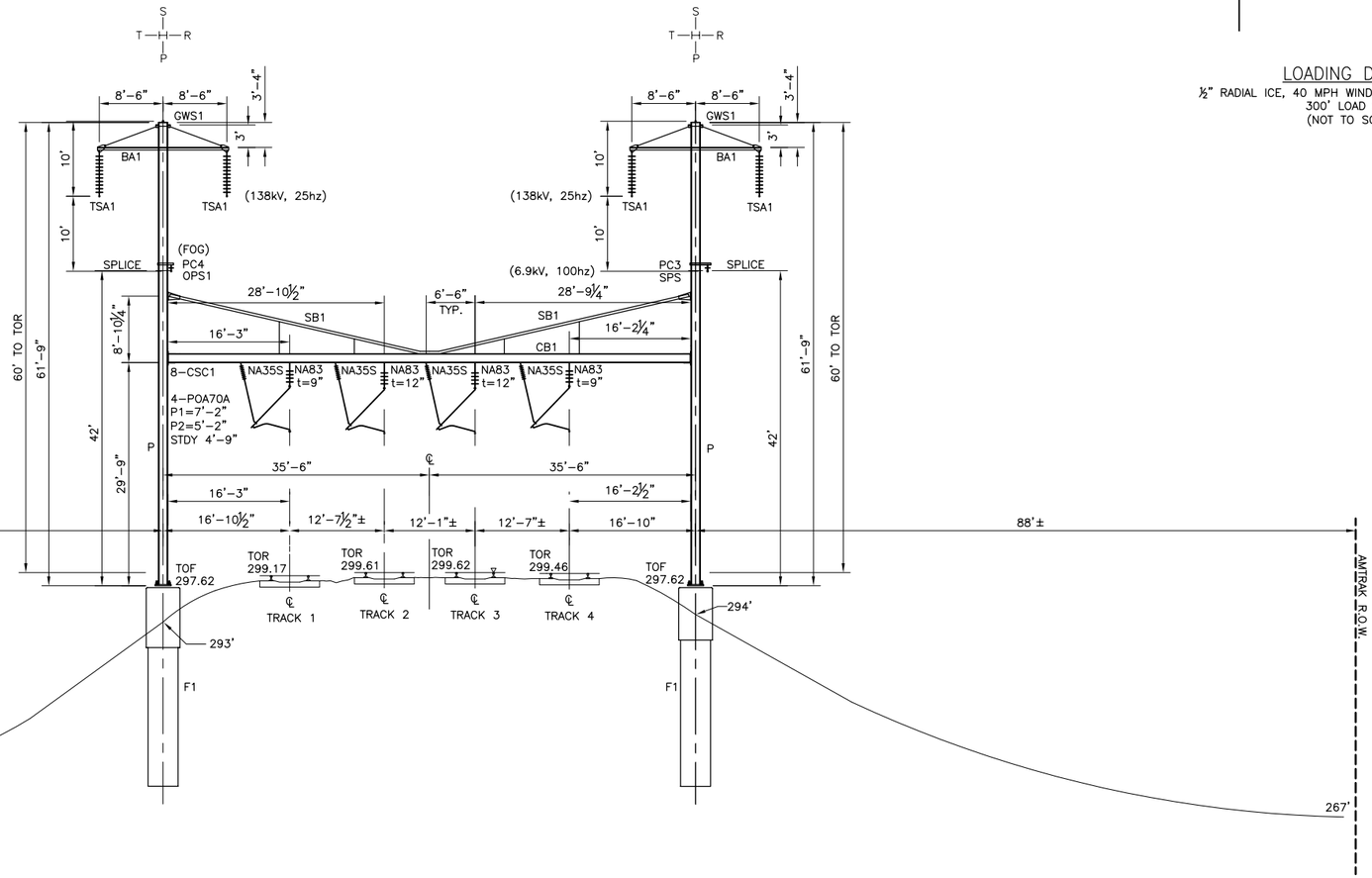
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Ref. No.:	2011–059
Sheet No:	136 OF 347

ET–1481

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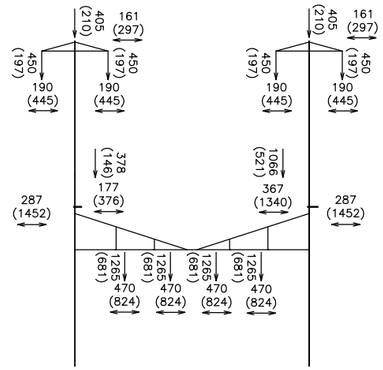
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–3"	24'–7"	24'–7"	24'–11½"
CW	19'–3"	18'–7"	18'–7"	18'–11½"



STRUCTURE ERECTION DIAGRAM T–174

384+65
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–174

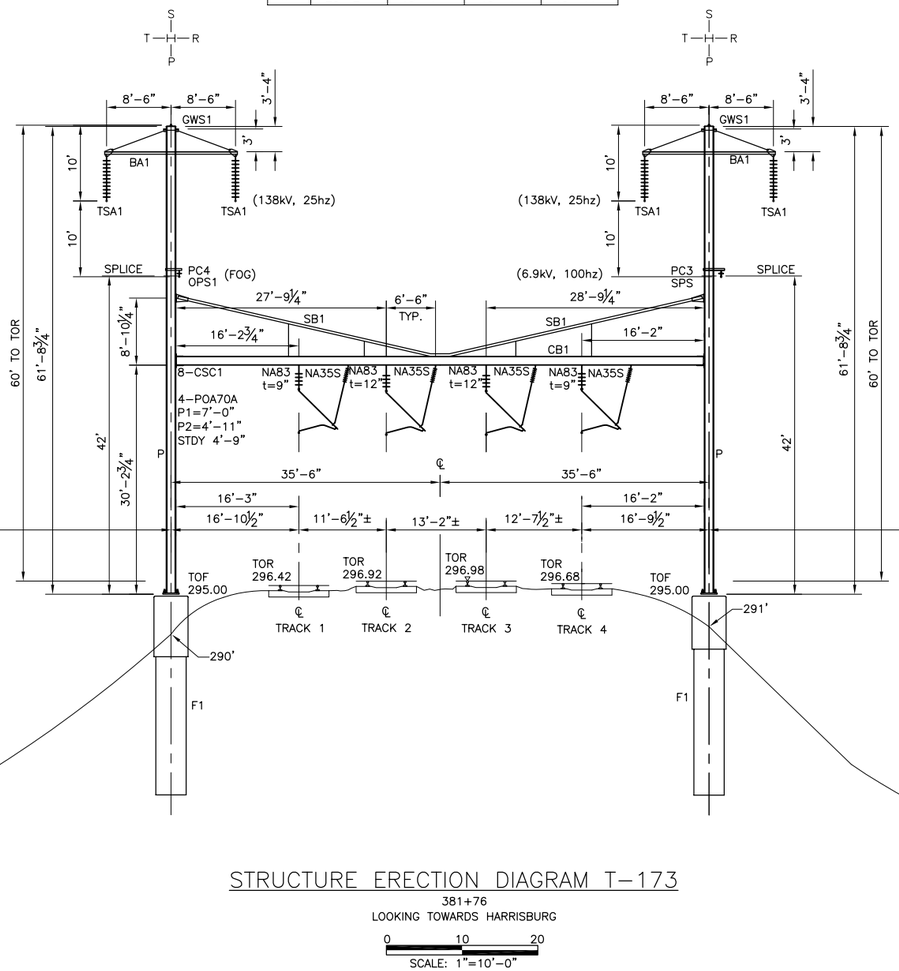
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File No.:	2011–059–ET–1482.DWG
Ref. No.:	2011–059
Sheet No:	137 OF 347

ET–1482

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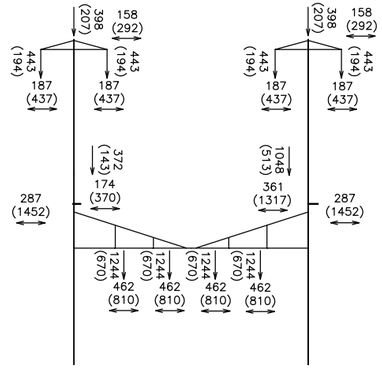
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–11"	25'–1"	25'–1"	25'–8"
CW	20'–2"	19'–4"	19'–4"	19'–11"



STRUCTURE ERECTION DIAGRAM T–173

381+76
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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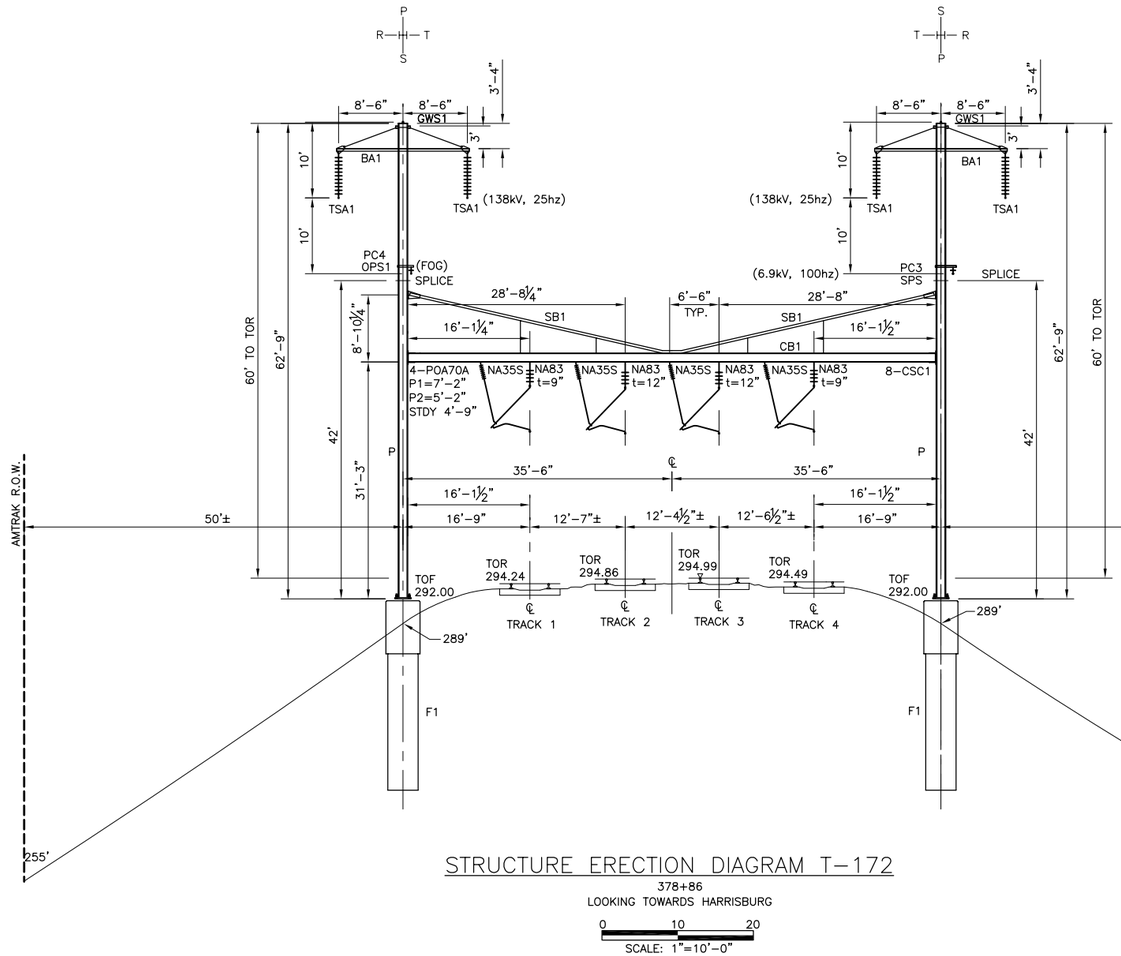
STRUCTURAL ERECTION DIAGRAM T–173

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1483.DWG
Ref. No.:	2011–059
Sheet No:	138 OF 347

ET–1483

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1¼"	25'–2¾"	25'–1¼"	25'–10¼"
CW	20'–1¼"	19'–2¾"	19'–1¼"	19'–10¼"



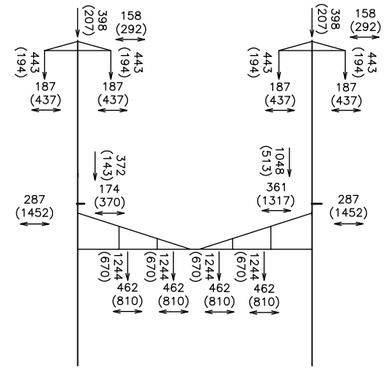
STRUCTURE ERECTION DIAGRAM T–172

378+86

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
295' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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National Railroad Passenger Corporation
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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–172

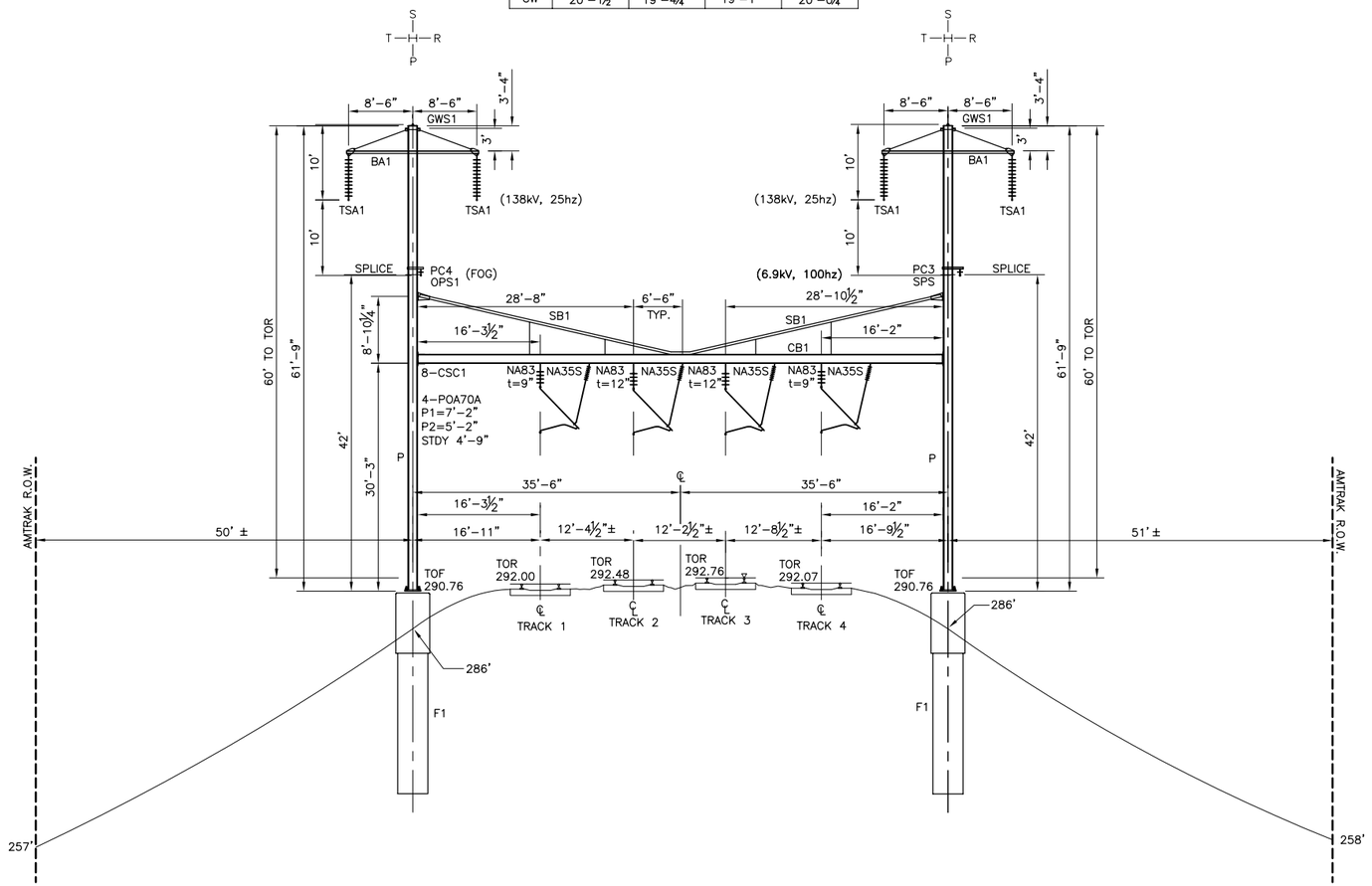
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1484.DWG
Ref. No.:	2011–059
Sheet No:	139 OF 347

ET–1484

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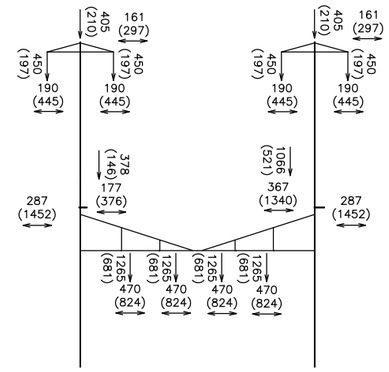
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–1½"	25'–4¼"	25'–1"	26'–0¾"
CW	20'–1½"	19'–4¼"	19'–1"	20'–0¾"



STRUCTURE ERECTION DIAGRAM T–171

375+86
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

½" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET –DOUBLE	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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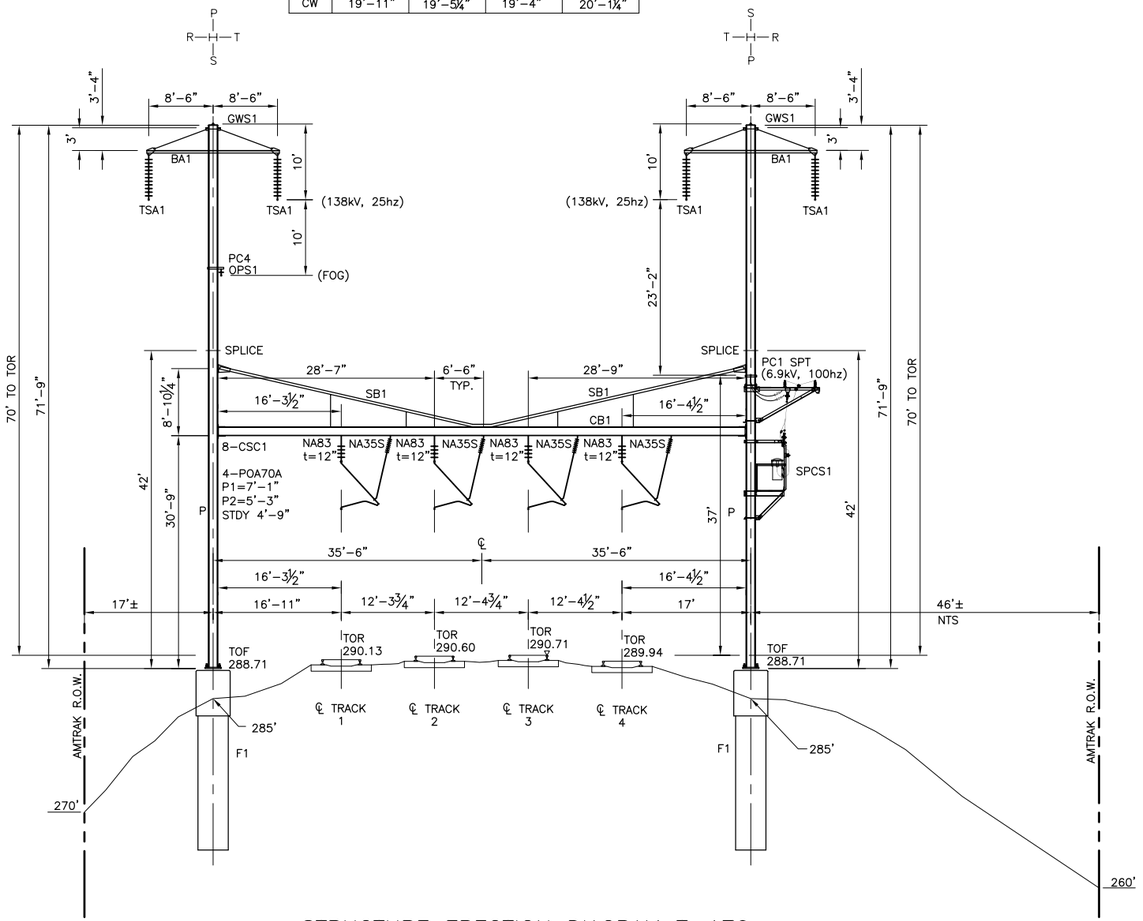
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–171

File No.:	2011–059–ET–1485.DWG
Ref. No.:	2011–059
Sheet No:	140 OF 347

ET–1485

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

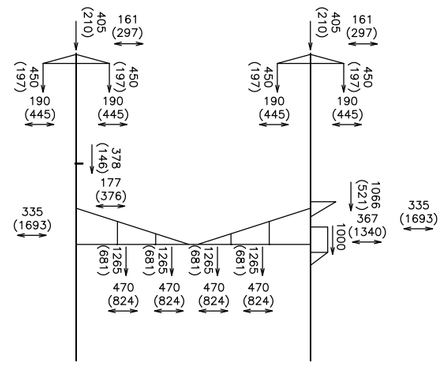
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–2"	25'–8¼"	25'–7"	26'–4¼"
CW	19'–11"	19'–5¼"	19'–4"	20'–1¼"



STRUCTURE ERECTION DIAGRAM T–170

372+84
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC INSULATOR ASSEMBLY	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC1	SLIDING CLAMP	S–5214	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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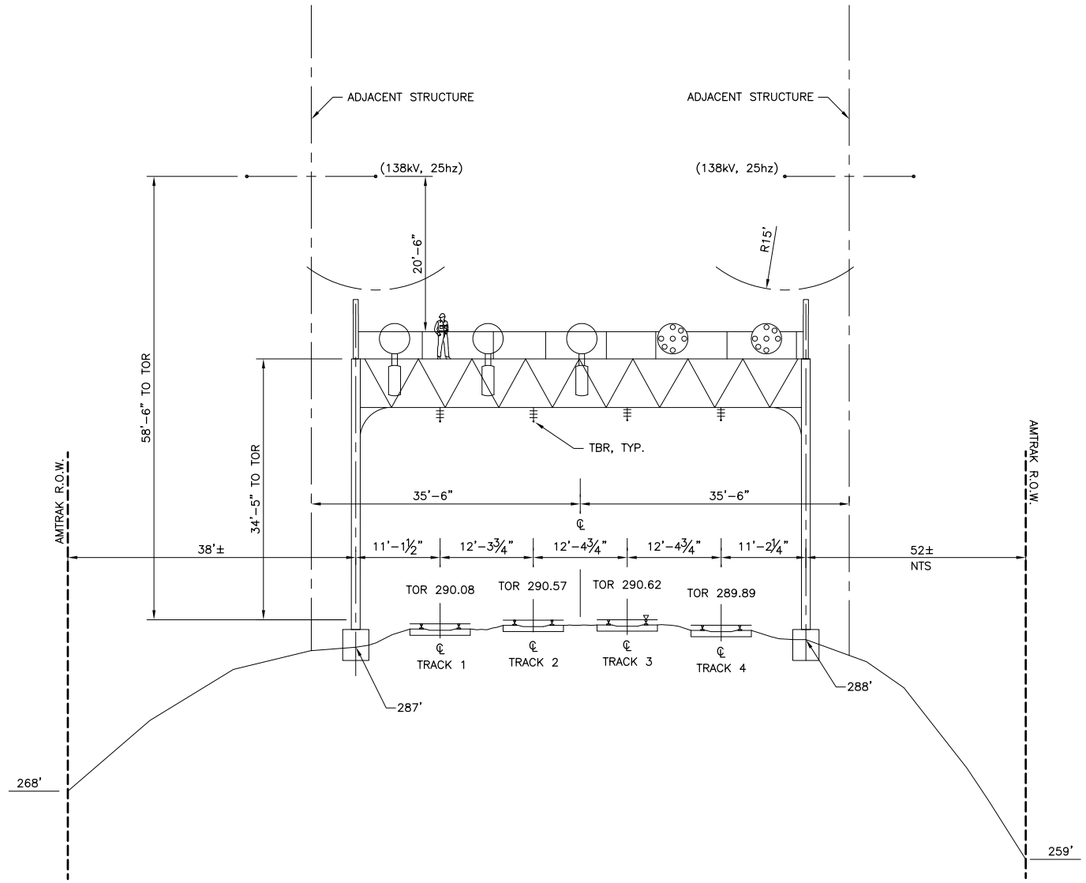
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–170

File No.:	2011–059–ET–1486.DWG
Ref. No.:	2011–059
Sheet No:	141 OF 347

ET–1486

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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STRUCTURE ERECTION DIAGRAM T-169 SB (P-37 SB)

372+75

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"

WORK STATEMENT:

1. GROUND STRUCTURE.
2. REMOVE CATENARY SUPPORTS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-169 SB (P-37 SB)

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

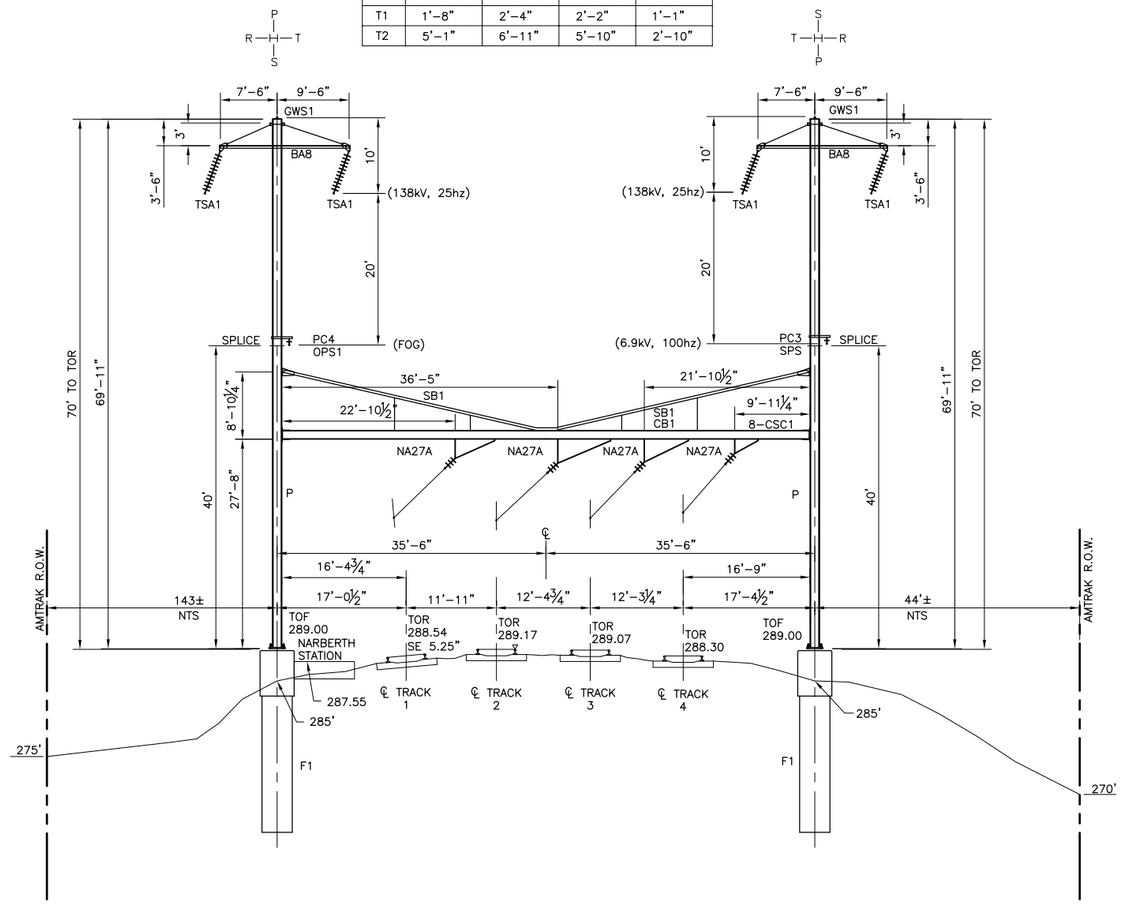
File No.:	2011-059-ET-1487.DWG
Ref. No.:	2011-059
Sheet No:	142 OF 347

ET-1487

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'-6½"	23'-3¾"	23'-5¾"	25'-4"
CW	18'-0"	17'-0¼"	17'-5¼"	18'-11¼"

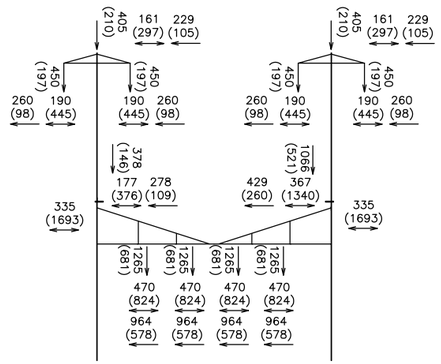
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'-8"	2'-4"	2'-2"	1'-1"
T2	5'-1"	6'-11"	5'-10"	2'-10"



STRUCTURE ERECTION DIAGRAM T-168

369+83
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET	S-5206	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-168

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

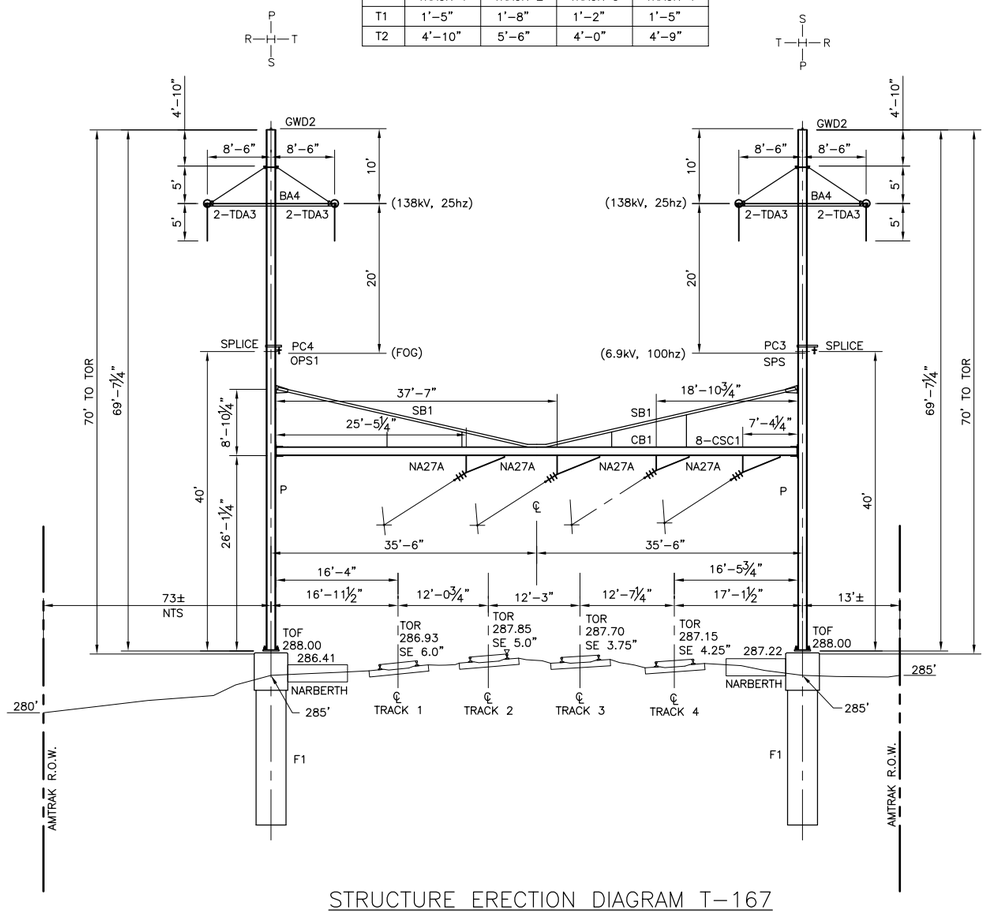
File No.:	2011-059-ET-1488.DWG
Ref. No.:	2011-059
Sheet No:	143 OF 347

ET-1488

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–1¾"	23'–0"	23'–8"	23'–11½"
CW	18'–2"	17'–2¼"	17'–4¾"	18'–2½"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–5"	1'–8"	1'–2"	1'–5"
T2	4'–10"	5'–6"	4'–0"	4'–9"



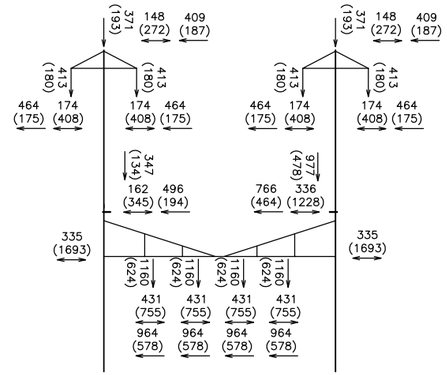
STRUCTURE ERECTION DIAGRAM T–167

366+94

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–167

File No.:	2011–059–ET–1489.DWG
Ref. No.:	2011–059
Sheet No:	144 OF 347

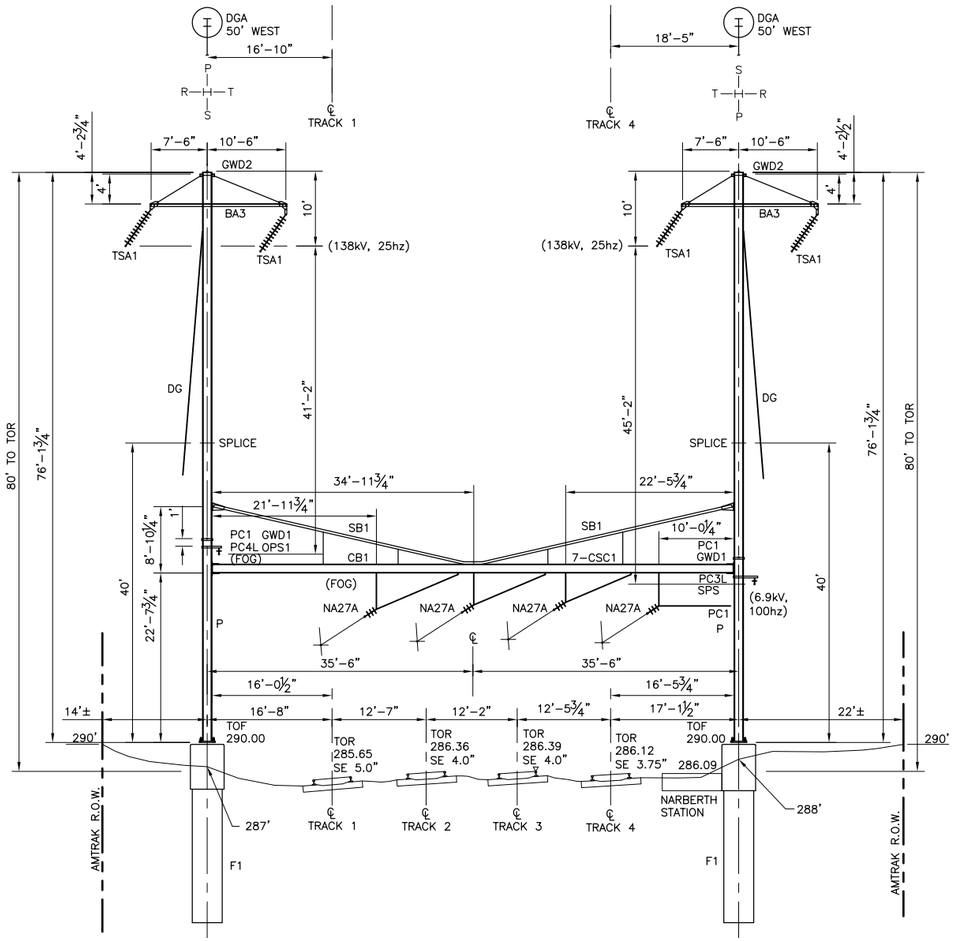
ET–1489

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	21'–4¾"	21'–3"	21'–7"	21'–4"
CW	17'–7¼"	17'–4¾"	17'–10"	17'–5½"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	4'–0"	3'–5"	3'–1"	3'–7"
T2	11'–2"	9'–9"	8'–10"	---



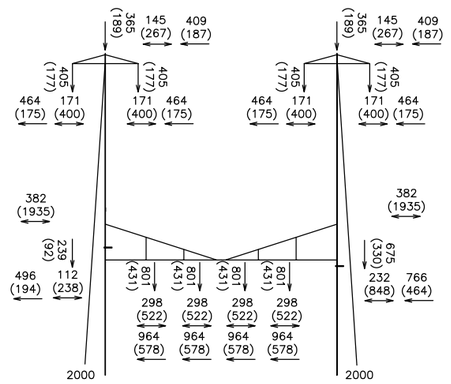
STRUCTURE ERECTION DIAGRAM T–166

364+34

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
270' TRANSMISSION SPAN
190' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
GWD1	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
DG	DOWNGUY	ET–1908	2
PC1	SLIDING CLAMP	S–5214	3
PC3L	SLIDING CLAMP	S–5215	1
PC4L	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	2
CSC1	SLIDING BRACKET	S–5214	7
DGA	DOWNGUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–166

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

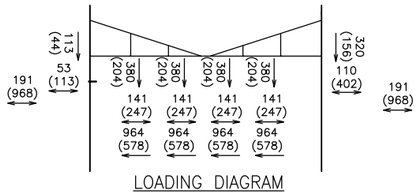
File No.:	2011–059–ET–1490.DWG
Ref. No.:	2011–059
Sheet No:	145 OF 347

ET–1490

BILL OF MATERIALS

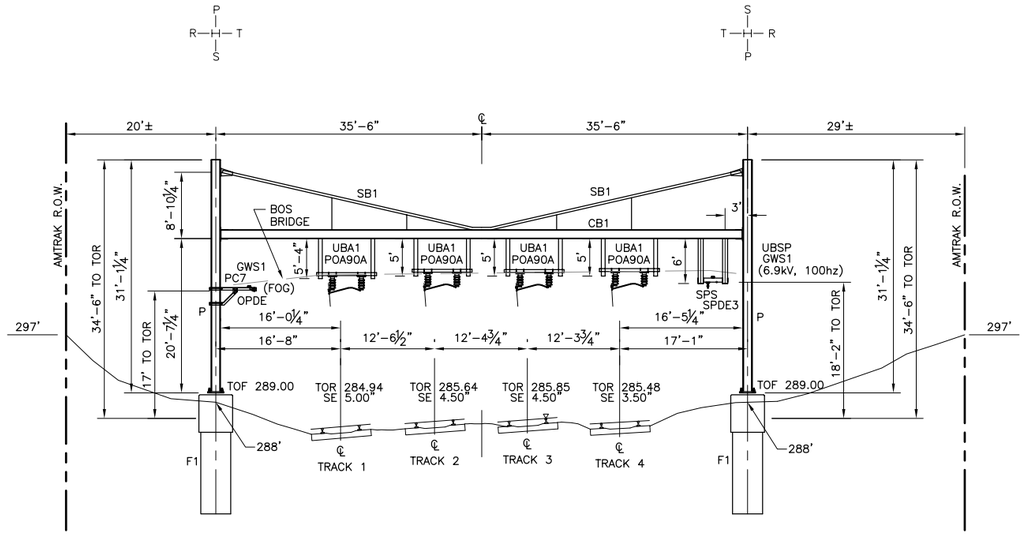
MARK	DESCRIPTION	REF. DWG.	QUANTITY
POA90A	UNDER BRIDGE SUPPORT	ET-1918	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
OPDE	FOG WIRE DEADEND	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEADEND	ET-1913	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
UBA1	UNDER BRIDGE BRACKET	S-5228	4
UBSP	SIGNAL POWER BRACKET	S-5240	1
PC4	SLIDING BRACKET	S-5215	1
PC7	SLIDING BRACKET	S-5239	1

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	18'-0"	17'-9"	17'-6"	18'-0"
CW	17'-6"	17'-4"	17'-3"	17'-8"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
90' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-165

363+21
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
Baker
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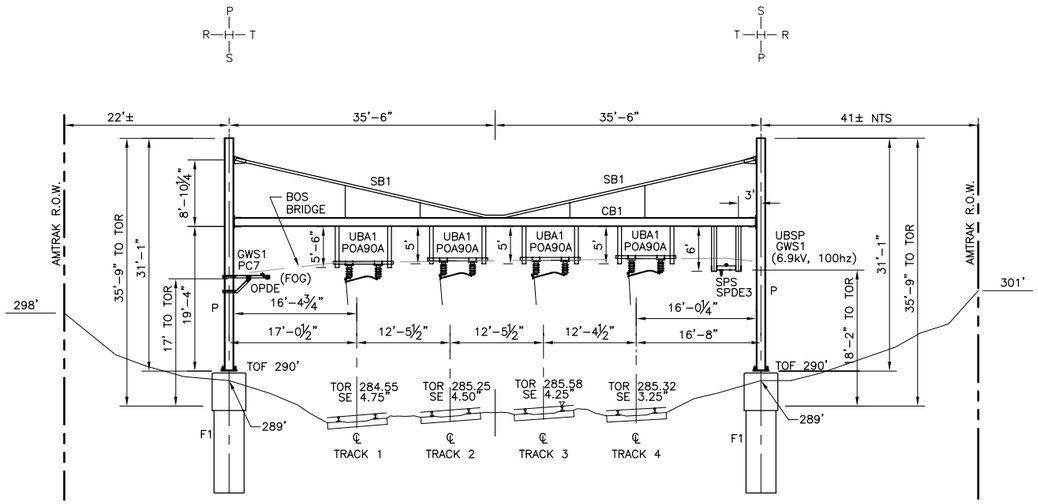
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-165

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1491.DWG
Ref. No.:	2011-059
Sheet No:	146 OF 347

ET-1491

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	18'–0"	17'–8½"	17'–6½"	18'–0½"
CW	17'–6"	17'–4½"	17'–2½"	17'–7½"



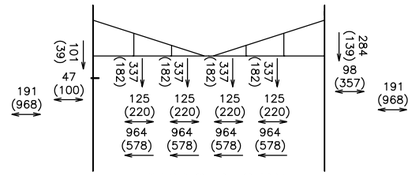
STRUCTURE ERECTION DIAGRAM T–164

362+60

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
80' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
POA90A	UNDER BRIDGE SUPPORT	ET–1918	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
OPDE	FOG WIRE DEADEND	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
SPDE3	SIGNAL POWER DEADEND	ET–1913	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
UBA1	UNDER BRIDGE BRACKET	S–5228	4
UBSP	SIGNAL POWER BRACKET	S–5240	1
PC4	SLIDING BRACKET	S–5215	1
PC7	SLIDING BRACKET	S–5239	1

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–164

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

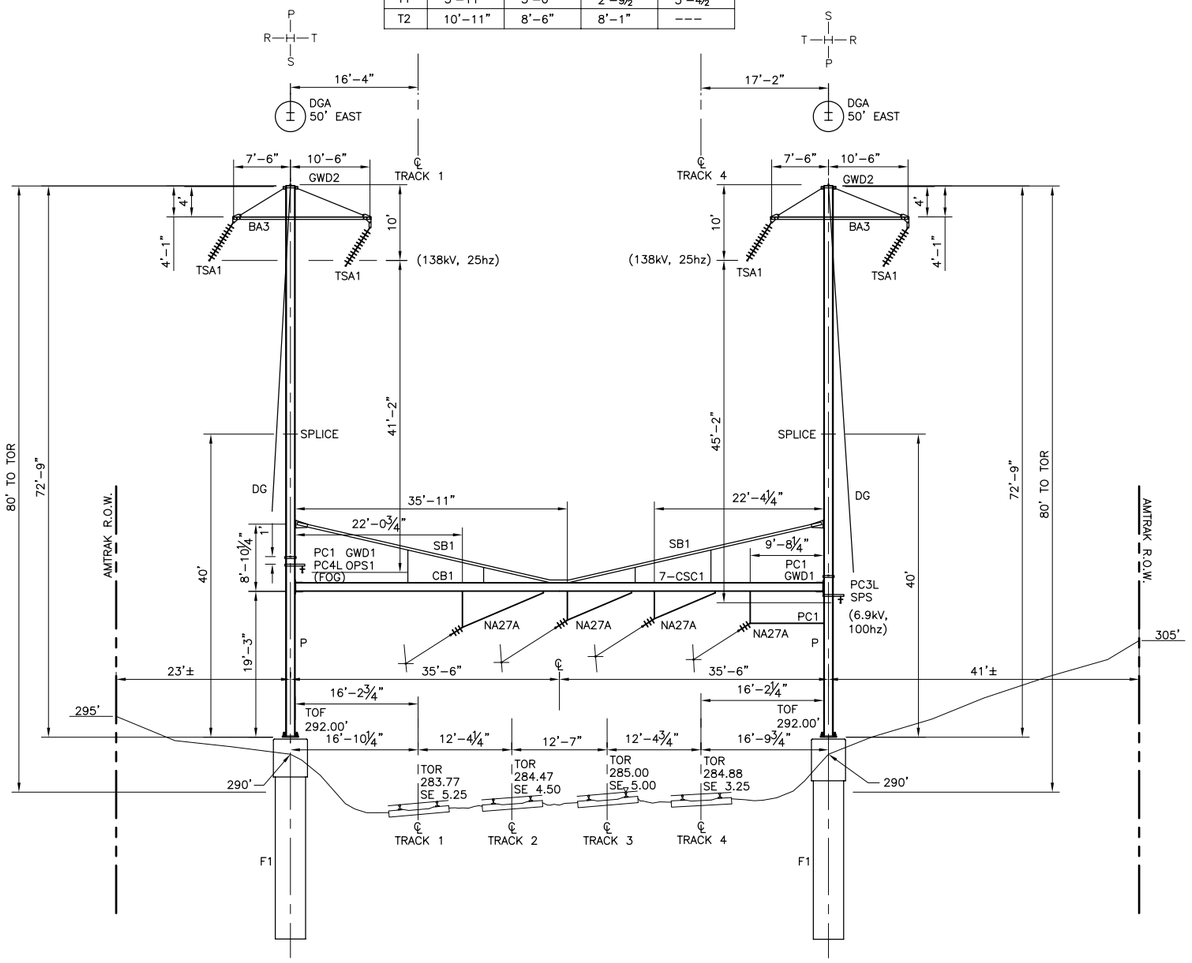
File No.:	2011–059–ET–1492.DWG
Ref. No.:	2011–059
Sheet No:	147 OF 347

ET–1492

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3/14/2016
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	21'–11½"	22'–2½"	21'–10½"	21'–4¾"
CW	18'–2¼"	17'–7¾"	17'–10¾"	17'–7½"

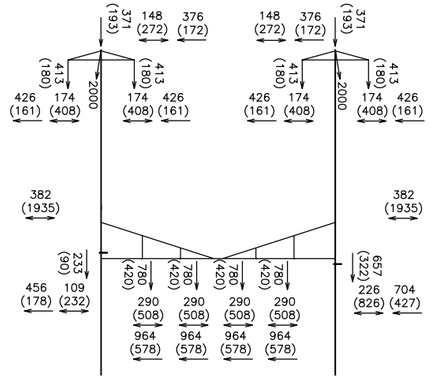
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	3'–11"	3'–0"	2'–9½"	3'–4½"
T2	10'–11"	8'–6"	8'–1"	---



STRUCTURE ERECTION DIAGRAM T–163

361+60
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' TRANSMISSION SPAN
185' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
GWD1	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
DG	DOWNGUY	ET–1908	2
PC1	SLIDING CLAMP	S–5214	3
PC3L	SLIDING CLAMP	S–5215	1
PC4L	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	2
CSC1	SLIDING BRACKET	S–5214	7
DGA	DOWNGUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–163

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

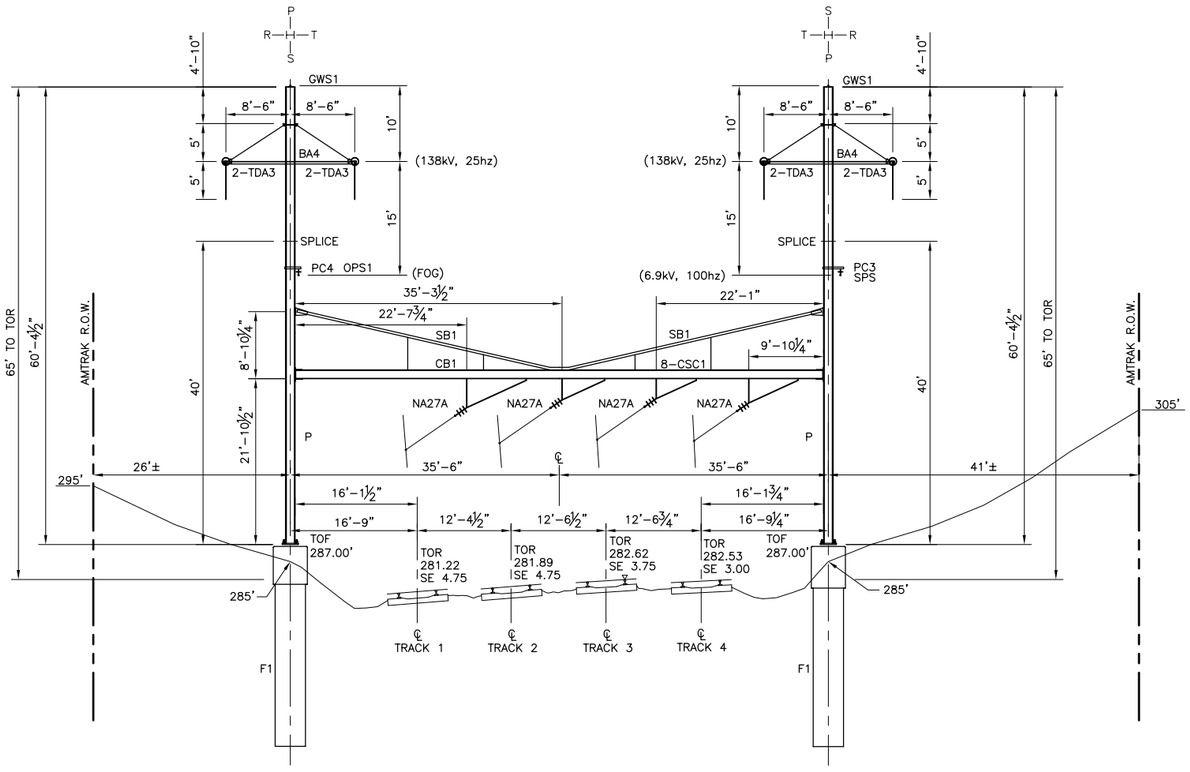
File No.:	2011–059–ET–1493.DWG
Ref. No.:	2011–059
Sheet No:	148 OF 347

ET–1493

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–0¼"	23'–4½"	22'–9¾"	22'–4"
CW	18'–6¼"	18'–8¾"	18'–5½"	18'–4¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	3'–0"	1'–11½"	1'–10"	2'–4"
T2	8'–0"	5'–6"	5'–2"	6'–6"



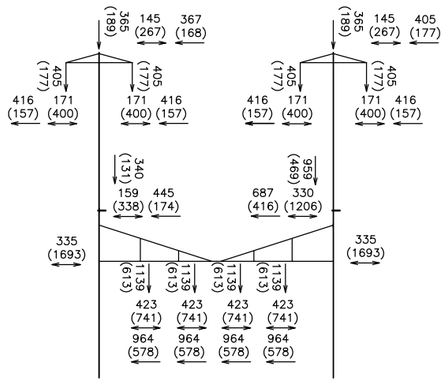
STRUCTURE ERECTION DIAGRAM T–162

358+90

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
270' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–162

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

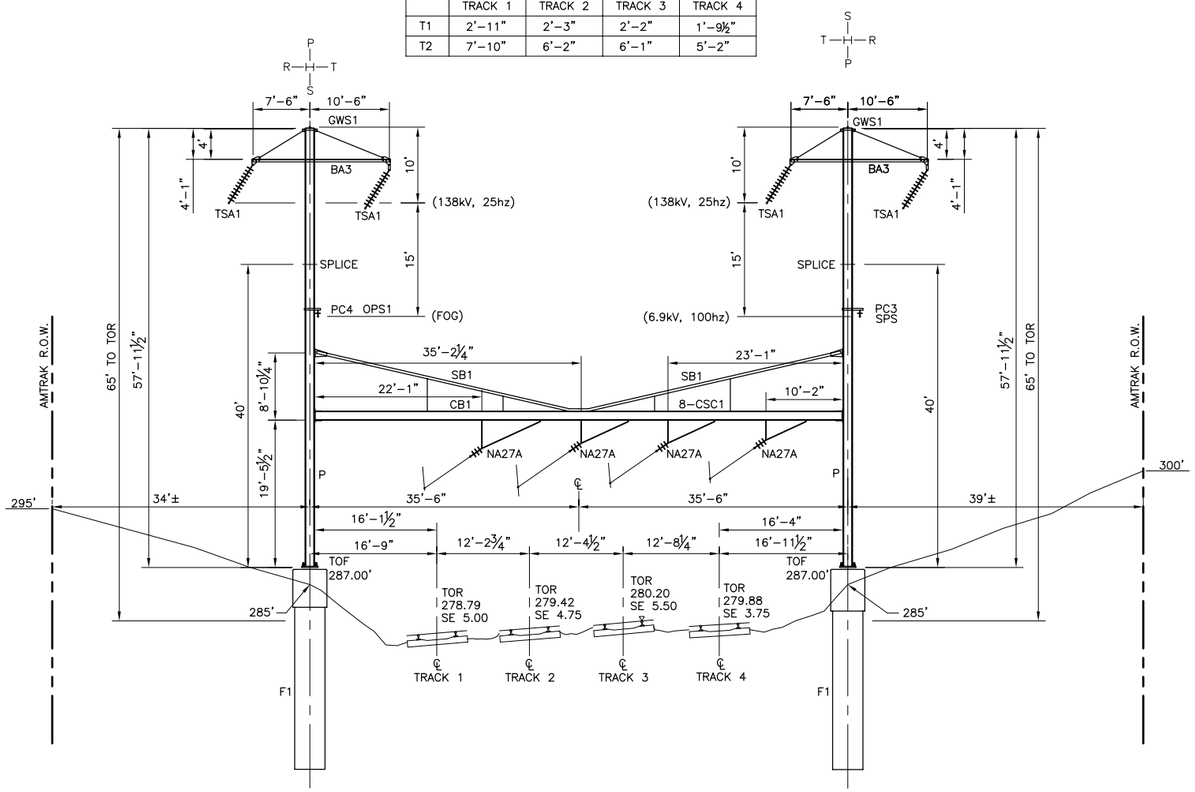
File No.:	2011–059–ET–1494.DWG
Ref. No.:	2011–059
Sheet No:	149 OF 347

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–1¼"	23'–2"	22'–5"	23'–1½"
CW	18'–11"	18'–5¼"	18'–2¼"	19'–1"

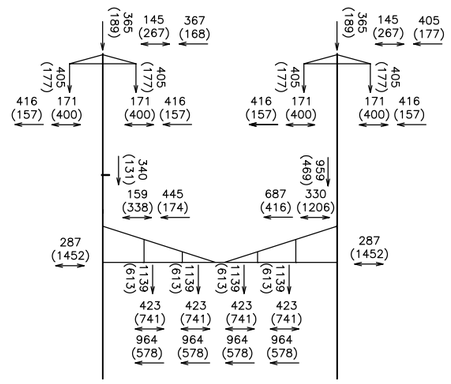
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'–11"	2'–3"	2'–2"	1'–9½"
T2	7'–10"	6'–2"	6'–1"	5'–2"



STRUCTURE ERECTION DIAGRAM T–161

356+21
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
270' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–161

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

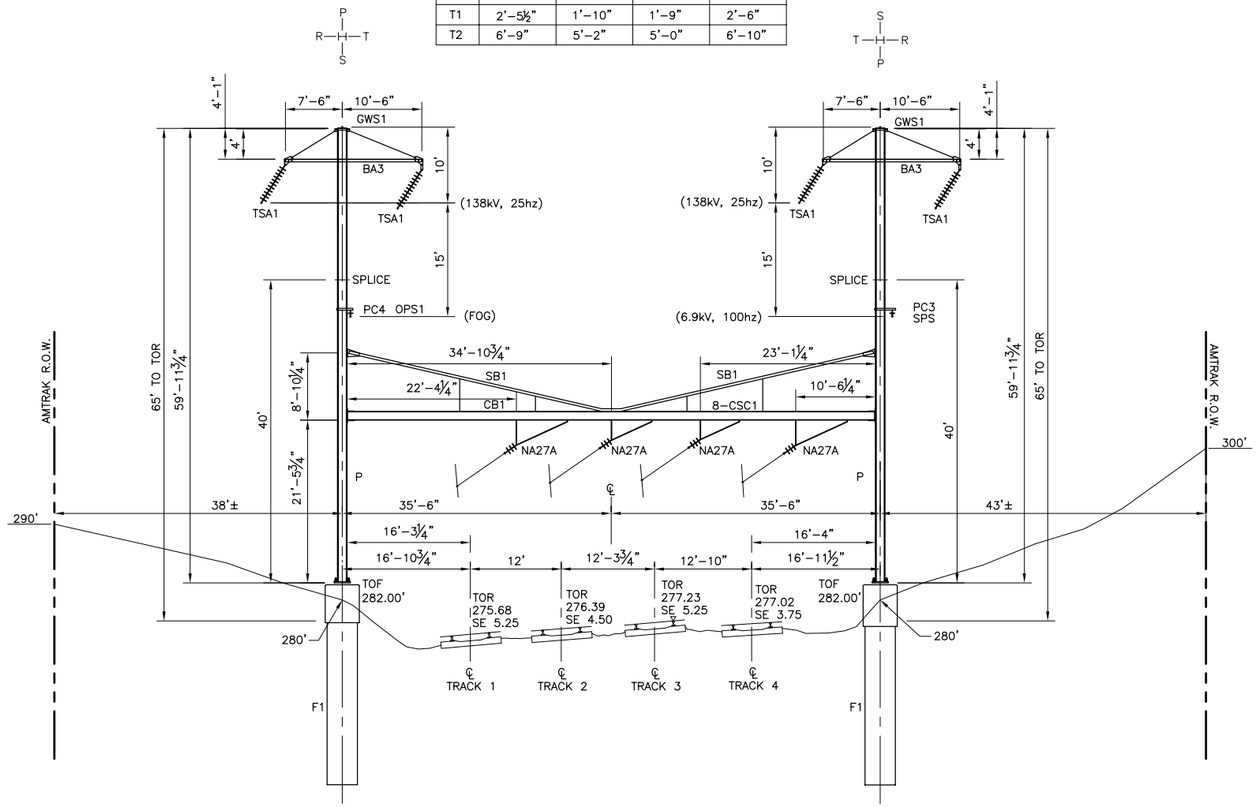
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ET–1495

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–8¼"	23'–7½"	22'–10½"	22'–3¾"
CW	19'–4"	19'–1"	18'–7"	18'–6½"

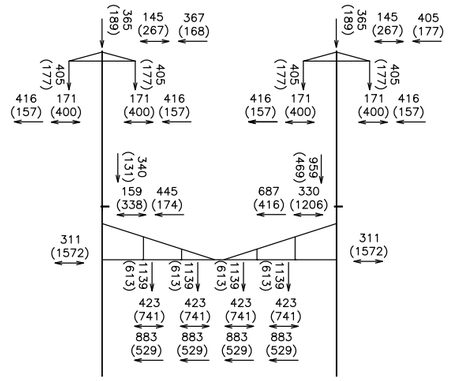
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'–5½"	1'–10"	1'–9"	2'–6"
T2	6'–9"	5'–2"	5'–0"	6'–10"



STRUCTURE ERECTION DIAGRAM T–160

353+51
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
270' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–160

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

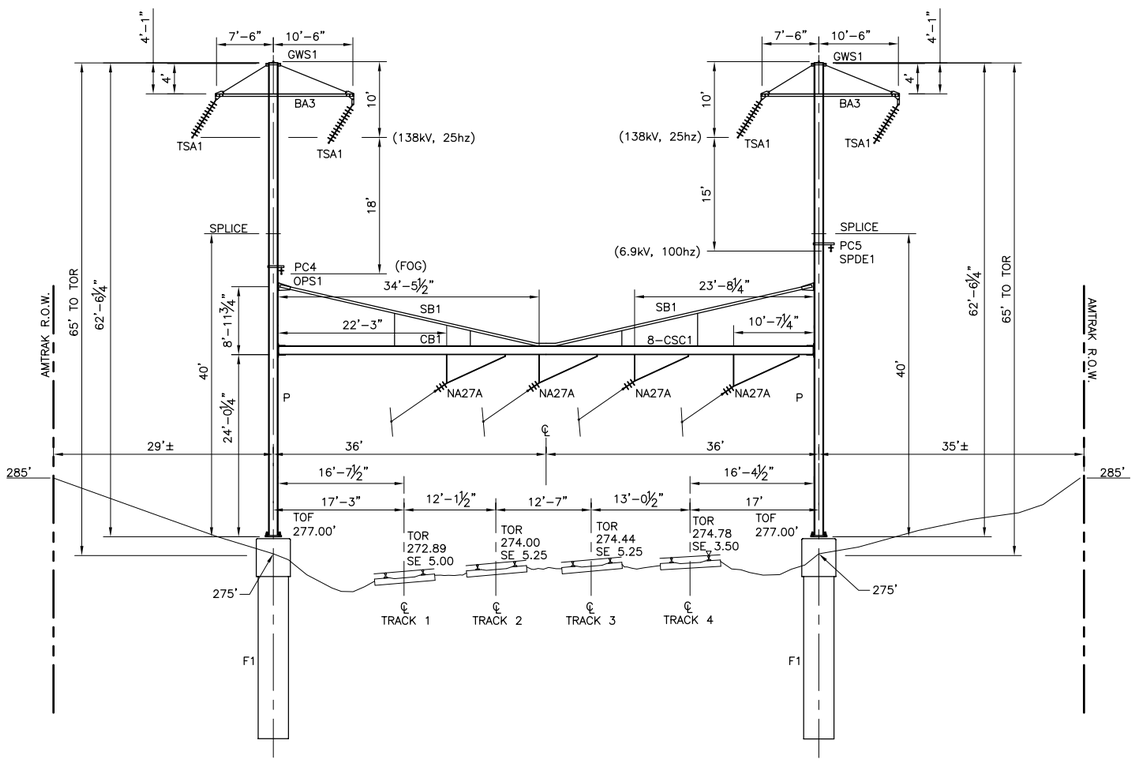
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Sheet No:	151 OF 347

ET–1496

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'-6¾"	22'-6"	22'-3¾"	21'-3¼"
CW	19'-7"	18'-5½"	18'-3¼"	17'-7½"

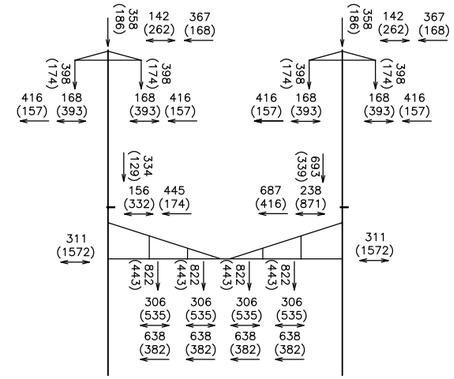
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'-11"	2'-11"	2'-8"	3'-4"
T2	7'-10"	7'-10"	7'-2"	8'-10"



STRUCTURE ERECTION DIAGRAM T-159

350+81
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
265' TRANSMISSION SPAN
195' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPDE1	SIGNAL POWER DEADEND	ET-1913	1
PC4	SLIDING CLAMP	S-5215	1
PC5	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA3	TRANSMISSION BRACKET	S-5202	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-159

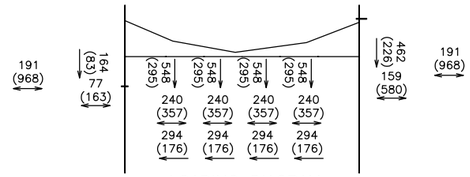
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1497.DWG
Ref. No.:	2011-059
Sheet No:	152 OF 347

ET-1497

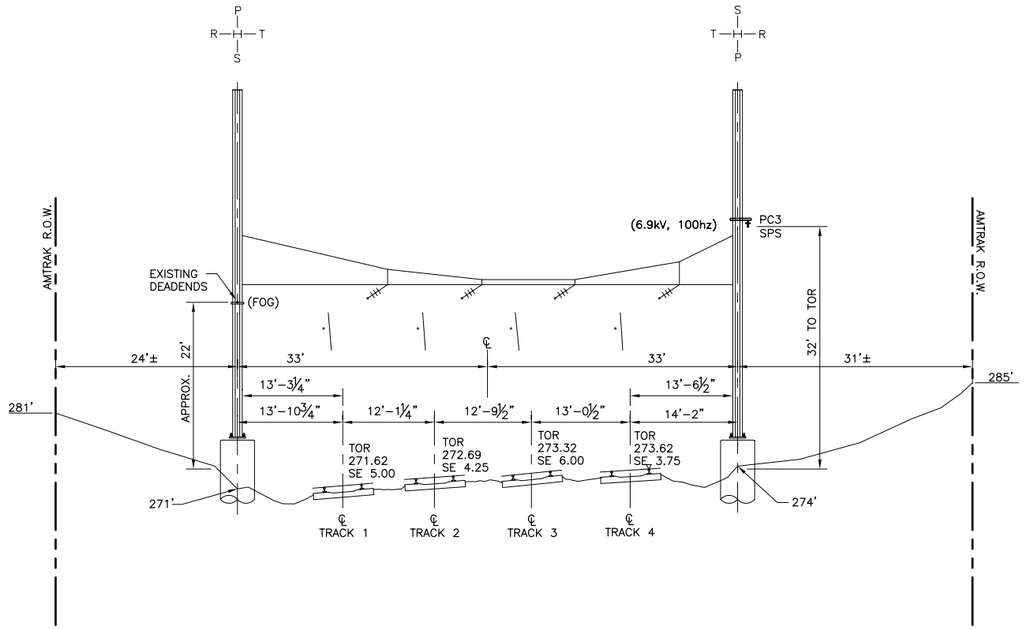
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5125	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
90' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-158 (EXISTING)

349+66
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL SLIDING BRACKET AND SIGNAL POWER ON EXISTING STRUCTURE.

NOTE:

1. STRUCTURE EXISTING NUMBER WAS P-27. LOCATED NEXT TO ROCKLAND AVENUE BRIDGE, THAT HAS BEEN REMOVED.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-158 (EXISTING)

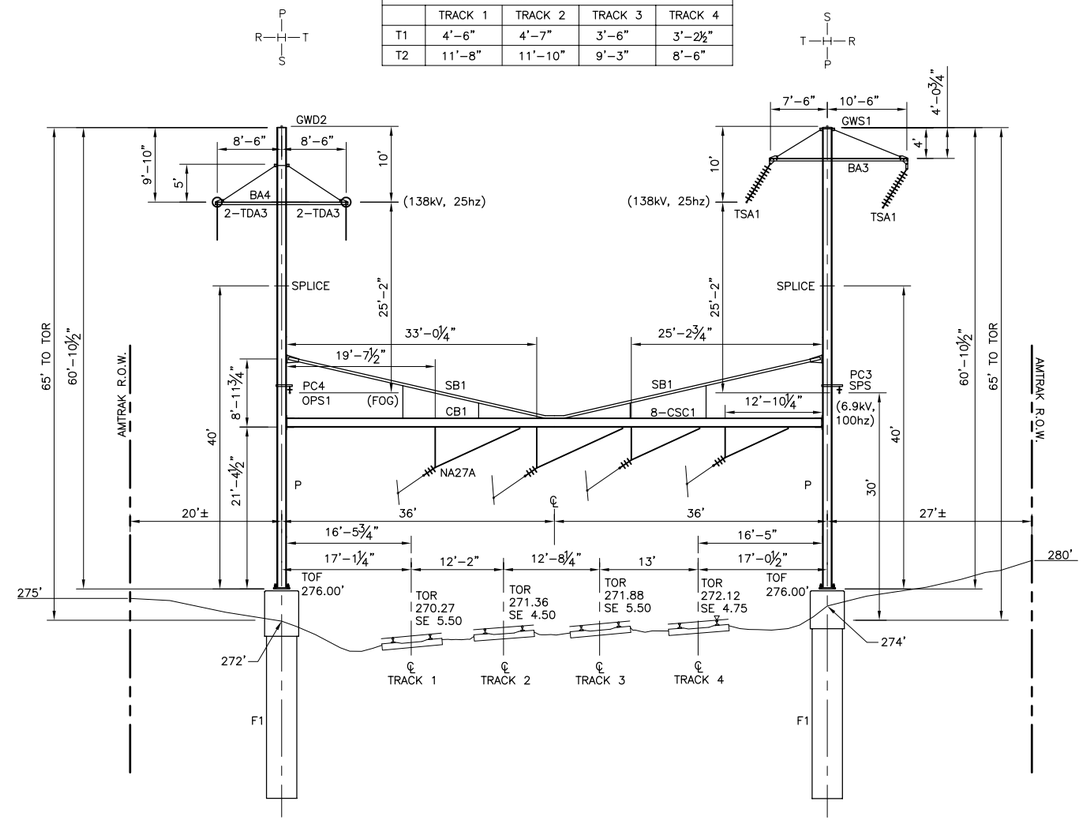
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1498.DWG
Ref. No.:	2011-059
Sheet No:	153 OF 347

ET-1498

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	21'–11½"	19'–9½"	20'–4"	20'–4¾"
CW	18'–7½"	16'–11"	17'–4¼"	17'–11¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	4'–6"	4'–7"	3'–6"	3'–2½"
T2	11'–8"	11'–10"	9'–3"	8'–6"



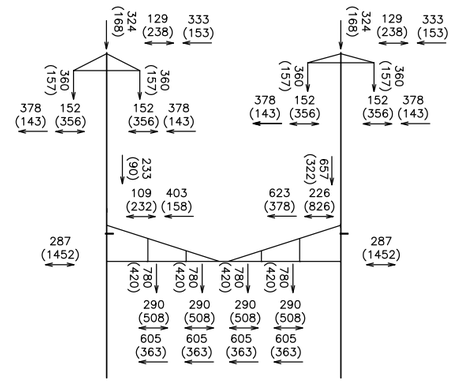
STRUCTURE ERECTION DIAGRAM T–157

348+21

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
240' TRANSMISSION SPAN
185' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA4	TRANSMISSION BRACKET	S–5203	1
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–157

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

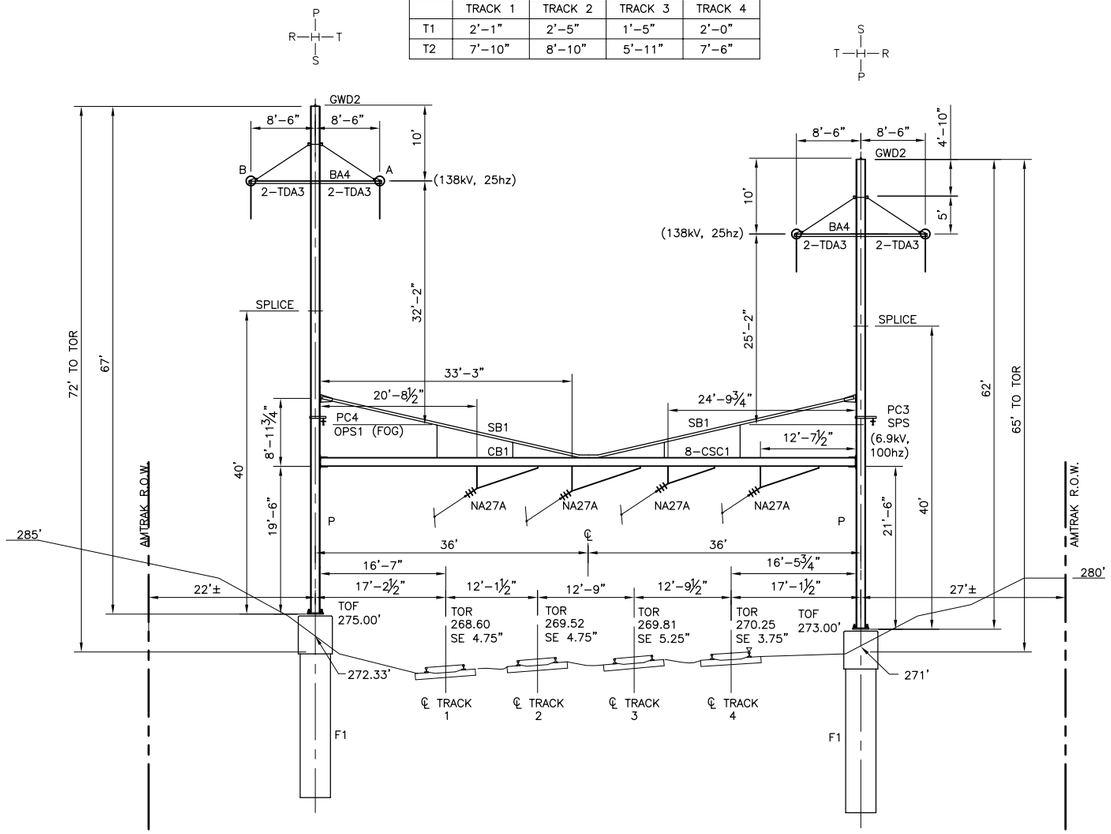
File No.:	2011–059–ET–1499.DWG
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	22'–2¾"	20'–11½"	21'–7¾"	20'–8"
CW	19'–6¼"	18'–0"	18'–7"	18'–4¼"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'–1"	2'–5"	1'–5"	2'–0"
T2	7'–10"	8'–10"	5'–11"	7'–6"



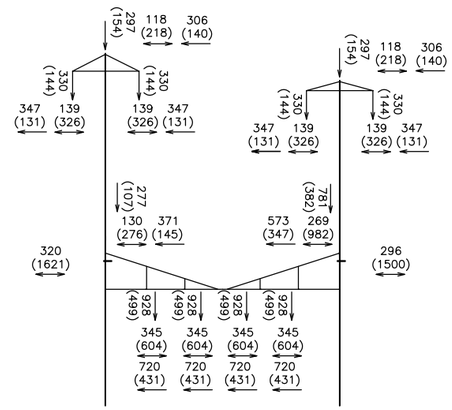
STRUCTURE ERECTION DIAGRAM T–156

346+01

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
220' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5103	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–156

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

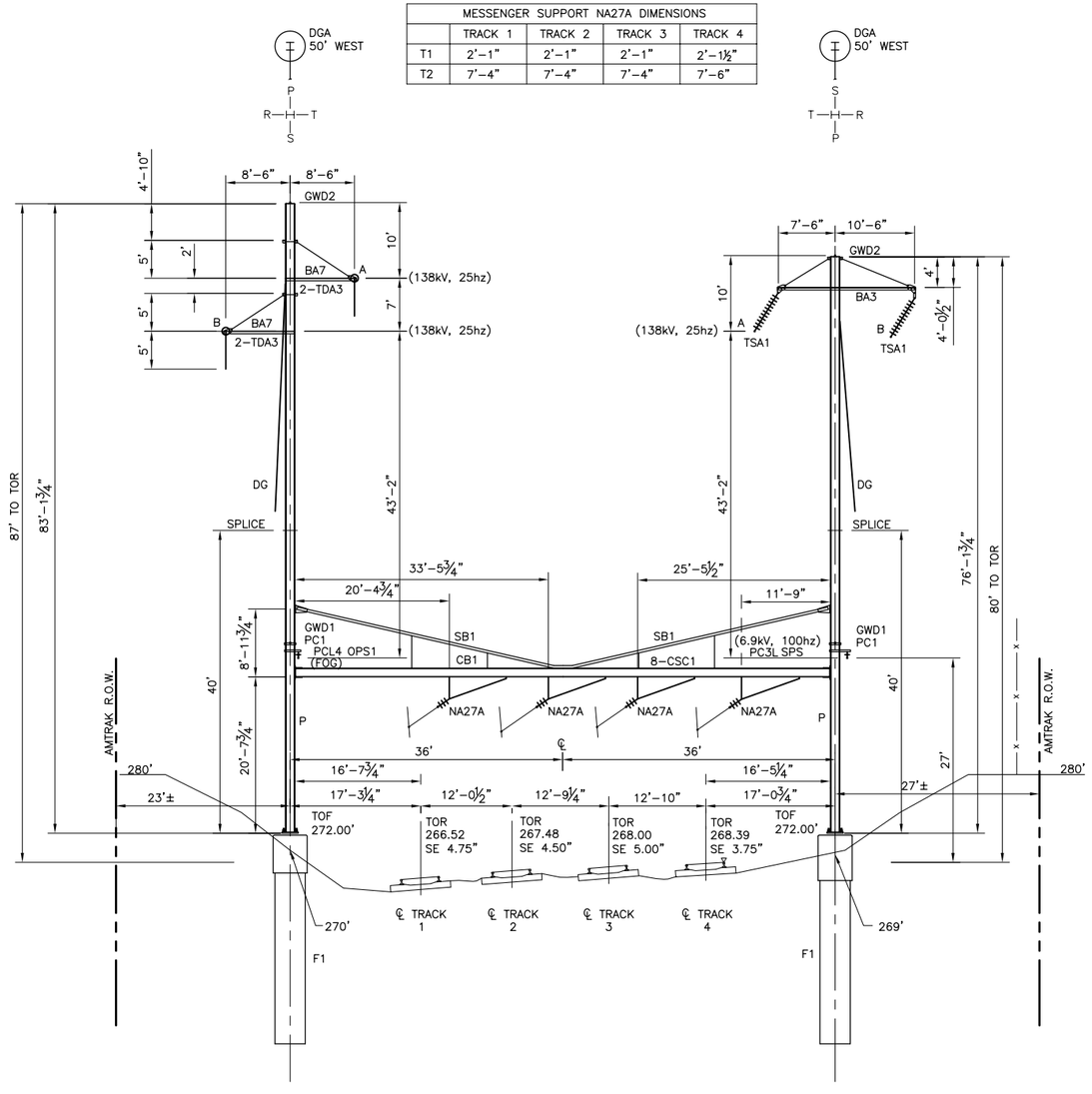
File No.:	2011–059–ET–1500.DWG
Ref. No.:	2011–059
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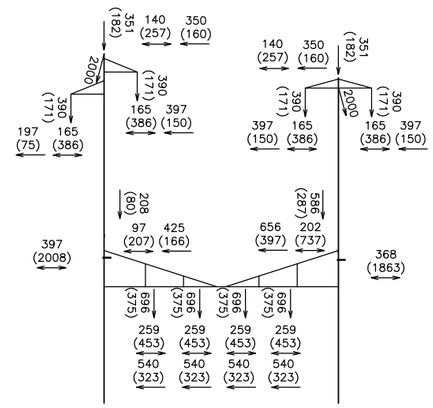
ET–1500

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	22'–5"	21'–5¾"	20'–11¼"	20'–6"
CW	19'–9¼"	18'–2½"	18'–3¾"	17'–6¼"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'–1"	2'–1"	2'–1"	2'–1½"
T2	7'–4"	7'–4"	7'–4"	7'–6"





LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' TRANSMISSION SPAN
165' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD1	GROUND WIRE DEADEND	ET–1909	2
GWD2	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
DG	DOWNGUY	ET–1908	2
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5215	2
PC3L	SLIDING CLAMP	S–5215	1
PC4L	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8
DGA	DOWNGUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

STRUCTURE ERECTION DIAGRAM T–155

343+81
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–155

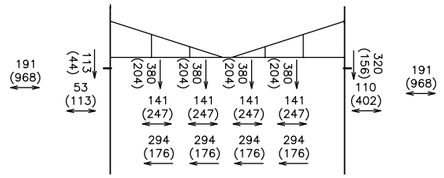
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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ET–1501

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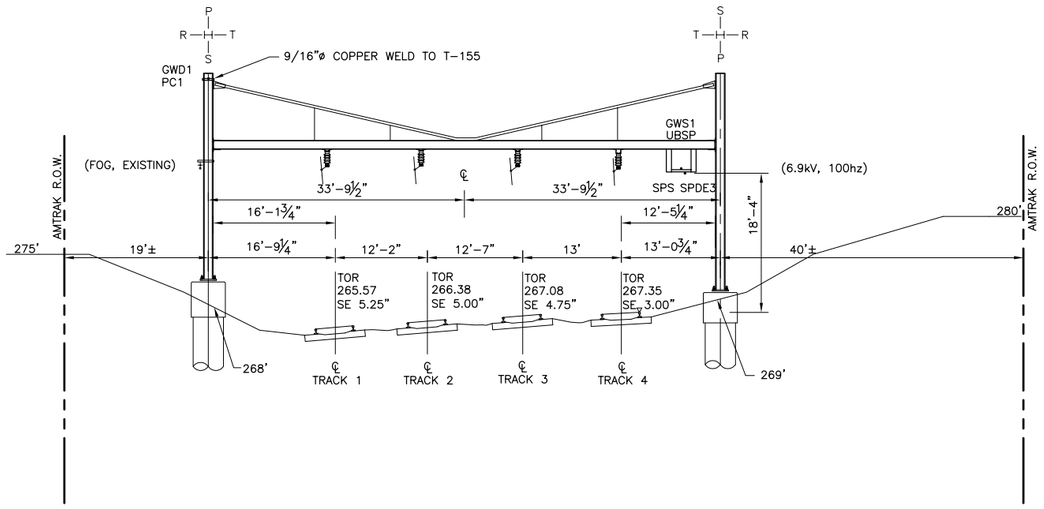
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET-1909	1
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEAD END	ET-1913	1
PC1	SLIDING CLAMP	S-5214	1
UBSP	SIGNAL POWER BRACKET	S-5240	1
–	9/16"ø CU-CLAD STEEL	ET-0093	400'



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
90' LOAD SPAN
(NOT TO SCALE)

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	21'-3¾"	20'-7"	19'-9"	19'-1¾"
CW	20'-9¾"	20'-0"	19'-1½"	18'-8¾"



STRUCTURE ERECTION DIAGRAM T-154 (EXISTING P-23)

342+73
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL NEW SIGNAL POWER BRACKET.
2. INSTALL NEW GROUND WIRE AND NEW SIGNAL POWER WIRE.
3. SHIFT EXISTING SIGNAL POWER TO NEW BRACKET.

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-154 (EXISTING)

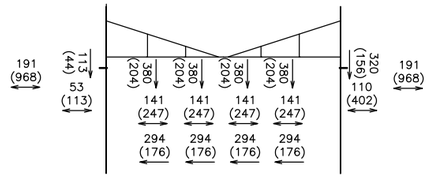
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1502.DWG
Ref. No.:	2011-059
Sheet No:	157 OF 347

ET-1502

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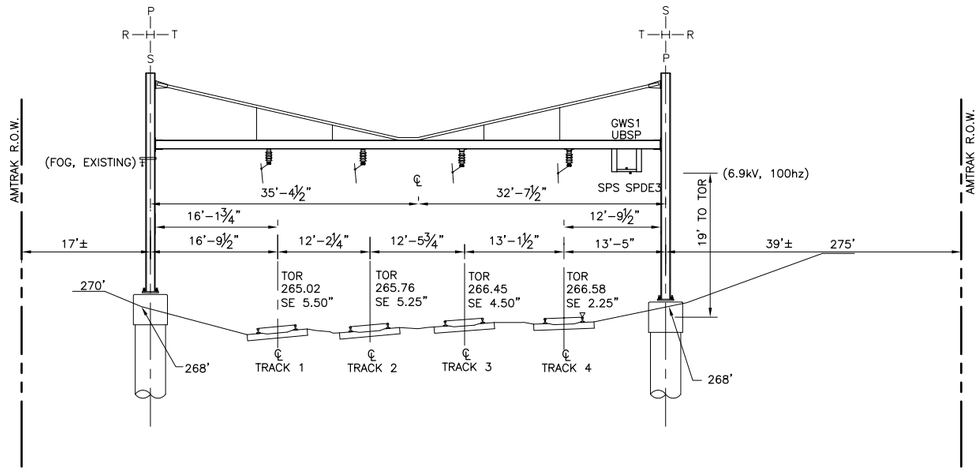
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
SPDE3	SIGNAL POWER DEAD END	ET-1913	1
UBSP	SIGNAL POWER BRACKET	S-5240	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
90' LOAD SPAN
(NOT TO SCALE)

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	21'-10"	20'-11"	20'-0"	19'-8"
CW	21'-1"	20'-3"	19'-1"	18'-9"



STRUCTURE ERECTION DIAGRAM T-153 (EXISTING P-22A)

342+08
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL NEW SIGNAL POWER BRACKET.
2. INSTALL NEW GROUND WIRE AND NEW SIGNAL POWER WIRE.
3. SHIFT EXISTING SIGNAL POWER TO NEW BRACKET.

100% DESIGN SUBMISSION

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Engineering
National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-153

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

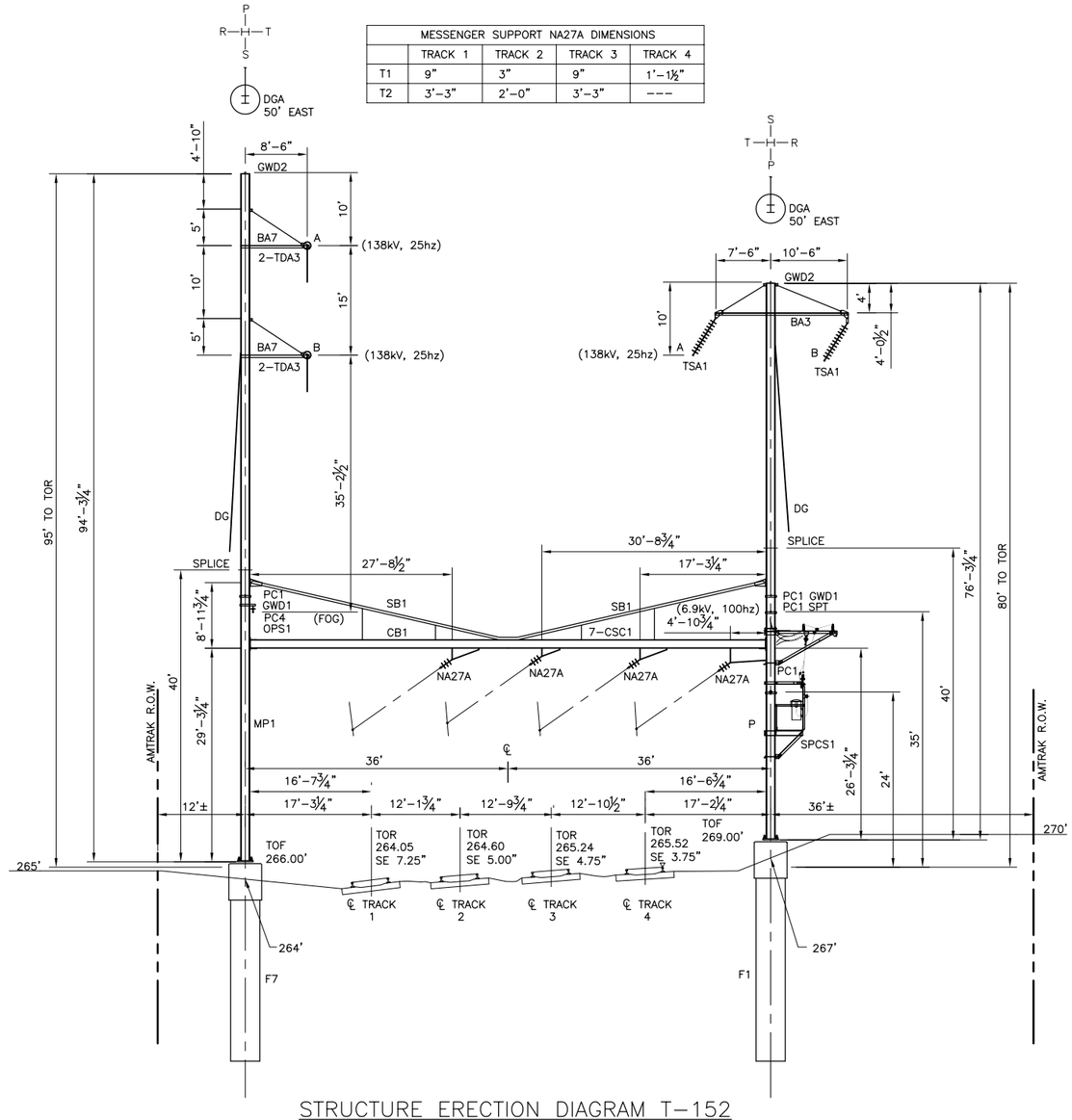
File No.:	2011-059-ET-1503.DWG
Ref. No.:	2011-059
Sheet No:	158 OF 347

ET-1503

4:26:21 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1503.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	28'–10¼"	28'–9"	27'–8"	26'–11½"
CW	21'–1½"	20'–9½"	20'–0"	19'–9¾"

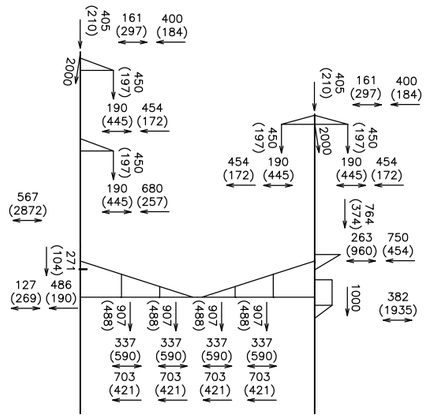
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	9"	3"	9"	1'–1½"
T2	3'–3"	2'–0"	3'–3"	---



STRUCTURE ERECTION DIAGRAM T–152

340+86
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' TRANSMISSION SPAN
215' CATENARY SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD1	GROUND WIRE DEADEND	ET–1909	2
GWD2	GROUND WIRE DEADEND	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
DG	DOWNGUY	ET–1908	2
PC1	SLIDING CLAMP	S–5214	5
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	1
F1	FOUNDATION	S–5102	1
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
MP1	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
DGA	DOWNGUY ANCHOR	S–5214	2
CSC1	SLIDING BRACKET	S–5210	7

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–152

File No.:	2011–059–ET–1504.DWG
Ref. No.:	2011–059
Sheet No:	159 OF 347

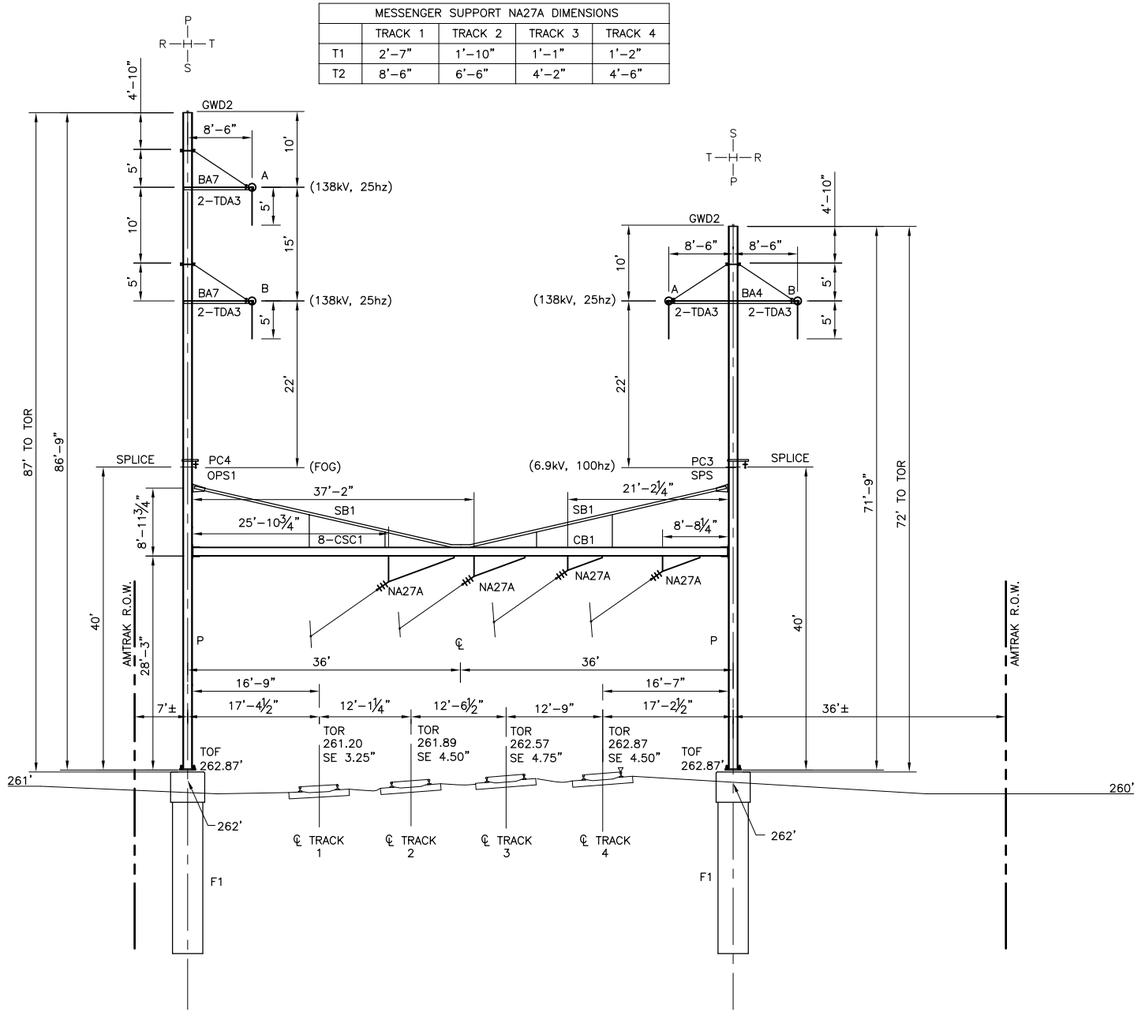
ET–1504

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'-8½"	25'-9"	25'-10¼"	25'-5"
CW	19'-7"	19'-11"	20'-1"	19'-10½"

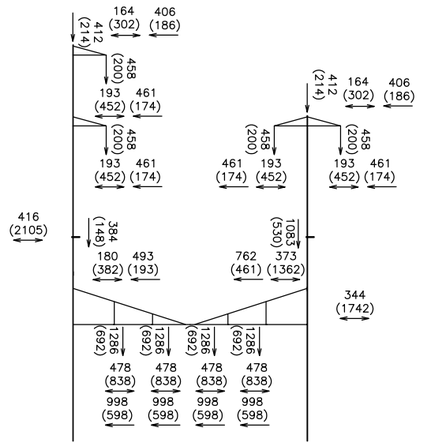
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	2'-7"	1'-10"	1'-1"	1'-2"
T2	8'-6"	6'-6"	4'-2"	4'-6"



STRUCTURE ERECTION DIAGRAM T-151

337+82
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
305' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWD2	GROUND WIRE DEADEND	ET-1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET	S-5203	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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OFFICE OF
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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

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BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-151

File No.:	2011-059-ET-1505.DWG
Ref. No.:	2011-059
Sheet No:	160 OF 347

ET-1505

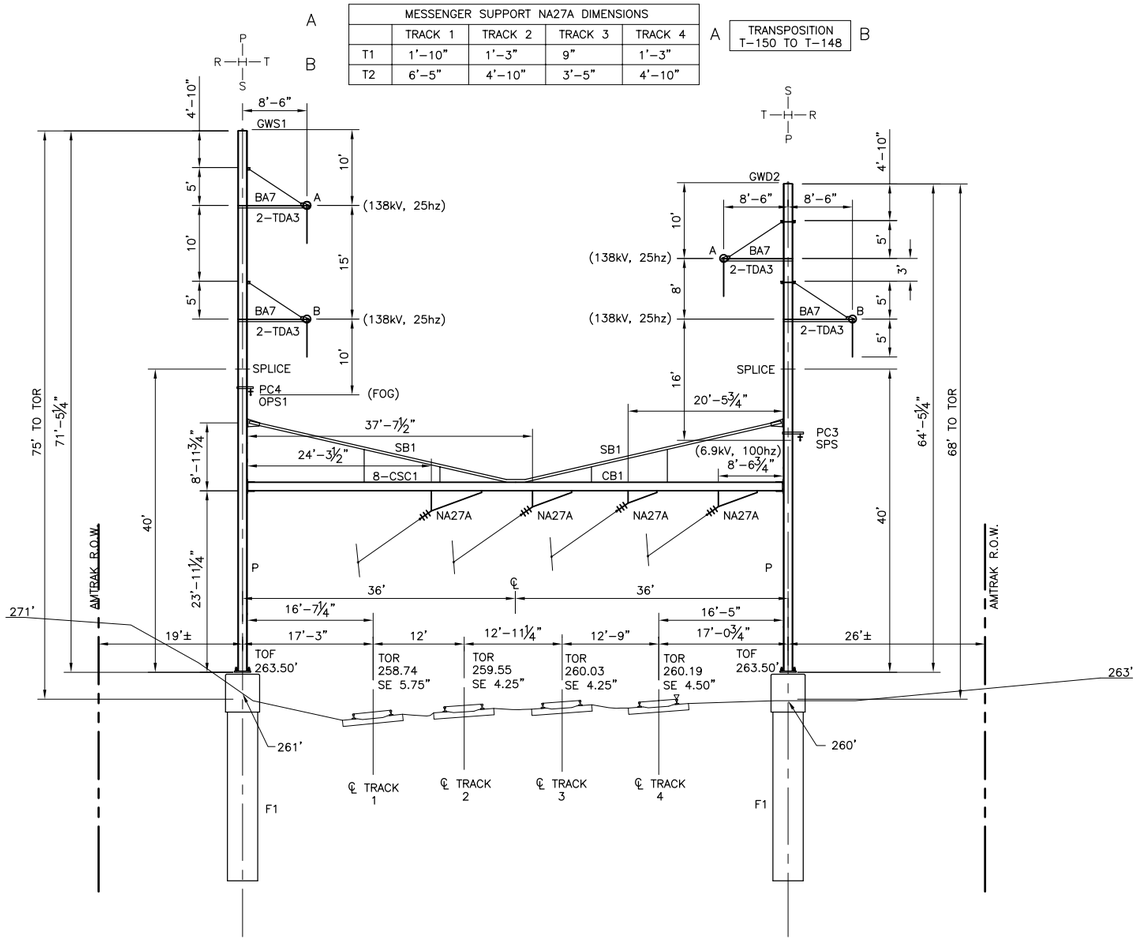
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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3/14/2016
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–2¾"	24'–11½"	24'–11¾"	24'–4¾"
CW	19'–6¼"	18'–8¾"	18'–11¾"	18'–10¾"

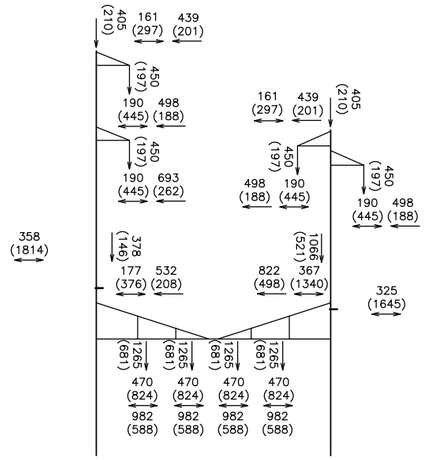
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–10"	1'–3"	9"	1'–3"
T2	6'–5"	4'–10"	3'–5"	4'–10"

A TRANSPOSITION T–150 TO T–148 B



STRUCTURE ERECTION DIAGRAM T–150

334+81
LOOKING TOWARDS HARRISBURG
0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE ASSEMBLY	ET–1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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IN ASSOCIATION WITH
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–150

File No.:	2011–059–ET–1506.DWG
Ref. No.:	2011–059
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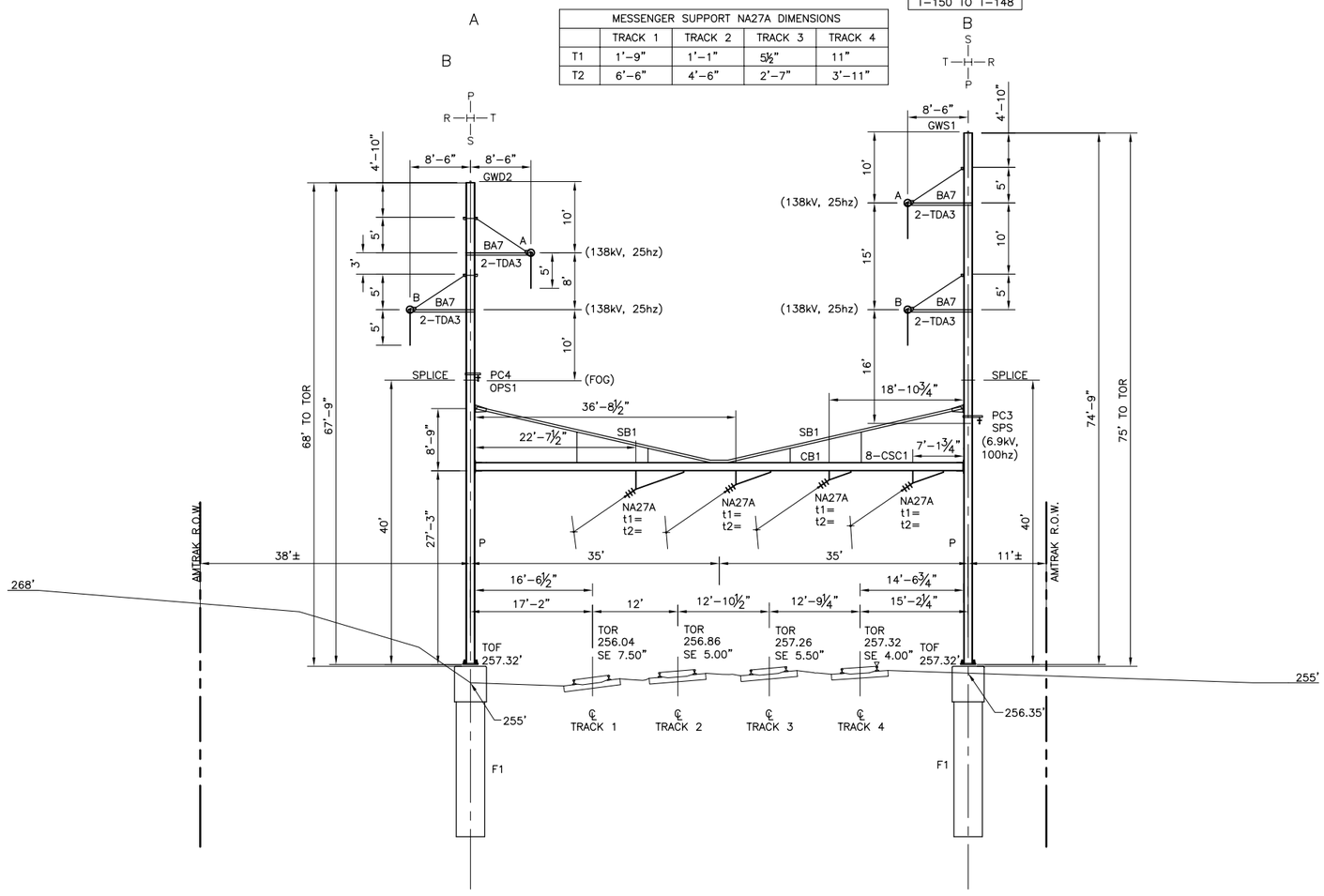
ET–1506

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–1½"	24'–11¾"	25'–2¾"	24'–8¾"
CW	20'–2¼"	19'–3½"	19'–3¼"	19'–9"

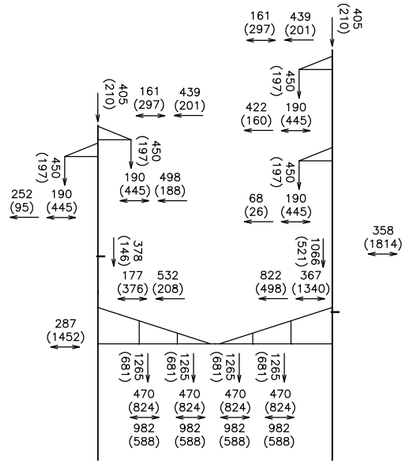
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–9"	1'–1"	5½"	11"
T2	6'–6"	4'–6"	2'–7"	3'–11"



STRUCTURE ERECTION DIAGRAM T–149

331+82
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE DEADEND	ET–1909	1
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA7	TRANSMISSION BRACKET	S–5205	4
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–149

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1507.DWG
Ref. No.:	2011–059
Sheet No:	162 OF 347

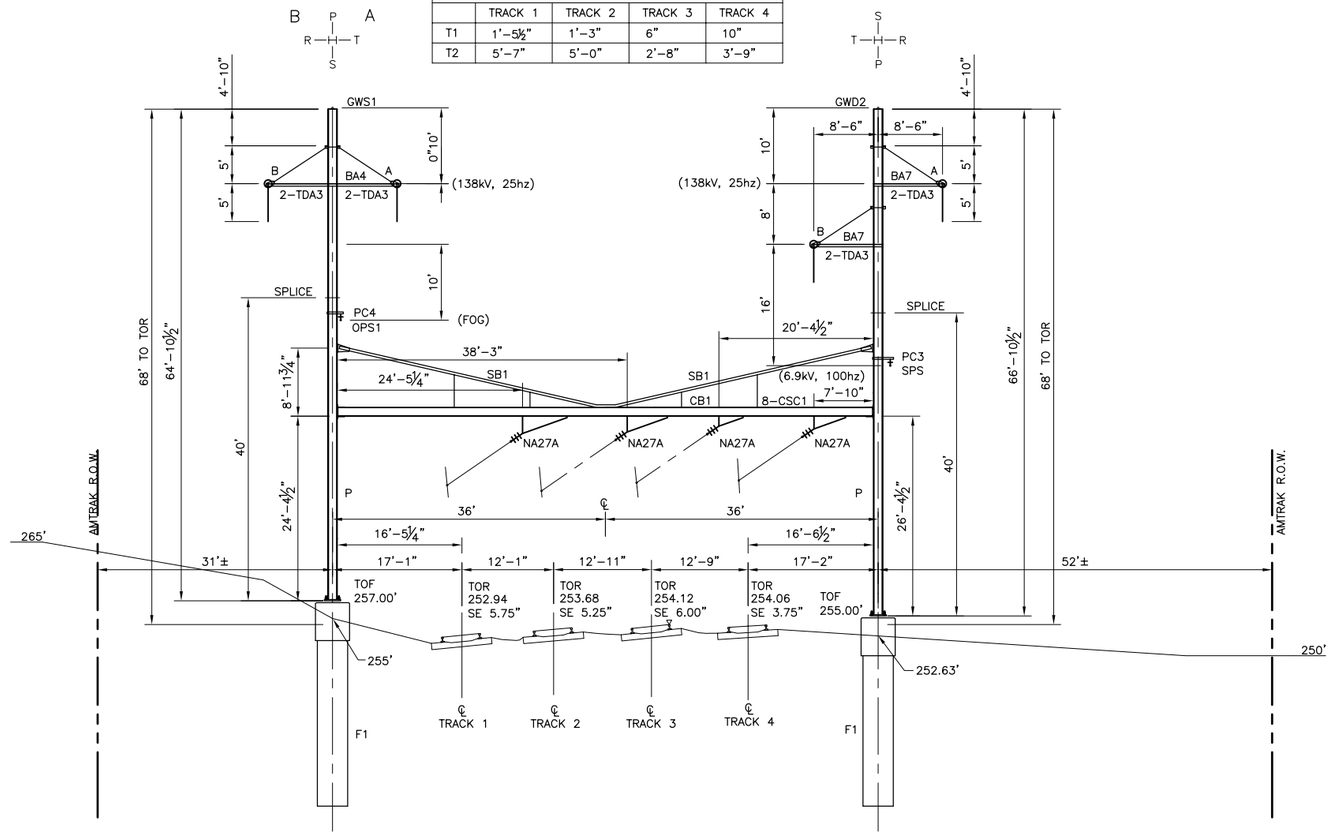
ET–1507

3/14/2016 4:26:50 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1507.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'-4¼"	24'-9¾"	25'-1½"	24'-10"
CW	19'-6¾"	18'-1"	18'-8½"	19'-0¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'-5½"	1'-3"	6"	10"
T2	5'-7"	5'-0"	2'-8"	3'-9"

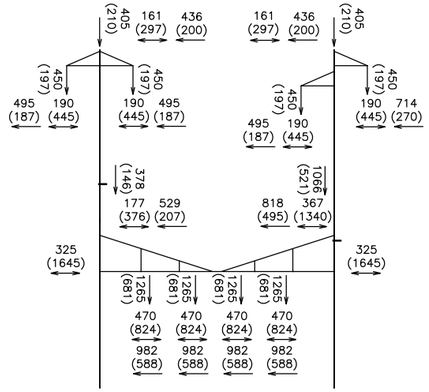
B TRANSPOSITION T-150 TO T-148 A



STRUCTURE ERECTION DIAGRAM T-148

328+81
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
GWD2	GROUND WIRE DEADEND	ET-1909	1
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET	S-5203	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-148

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1508.DWG
Ref. No.:	2011-059
Sheet No:	163 OF 347

ET-1508

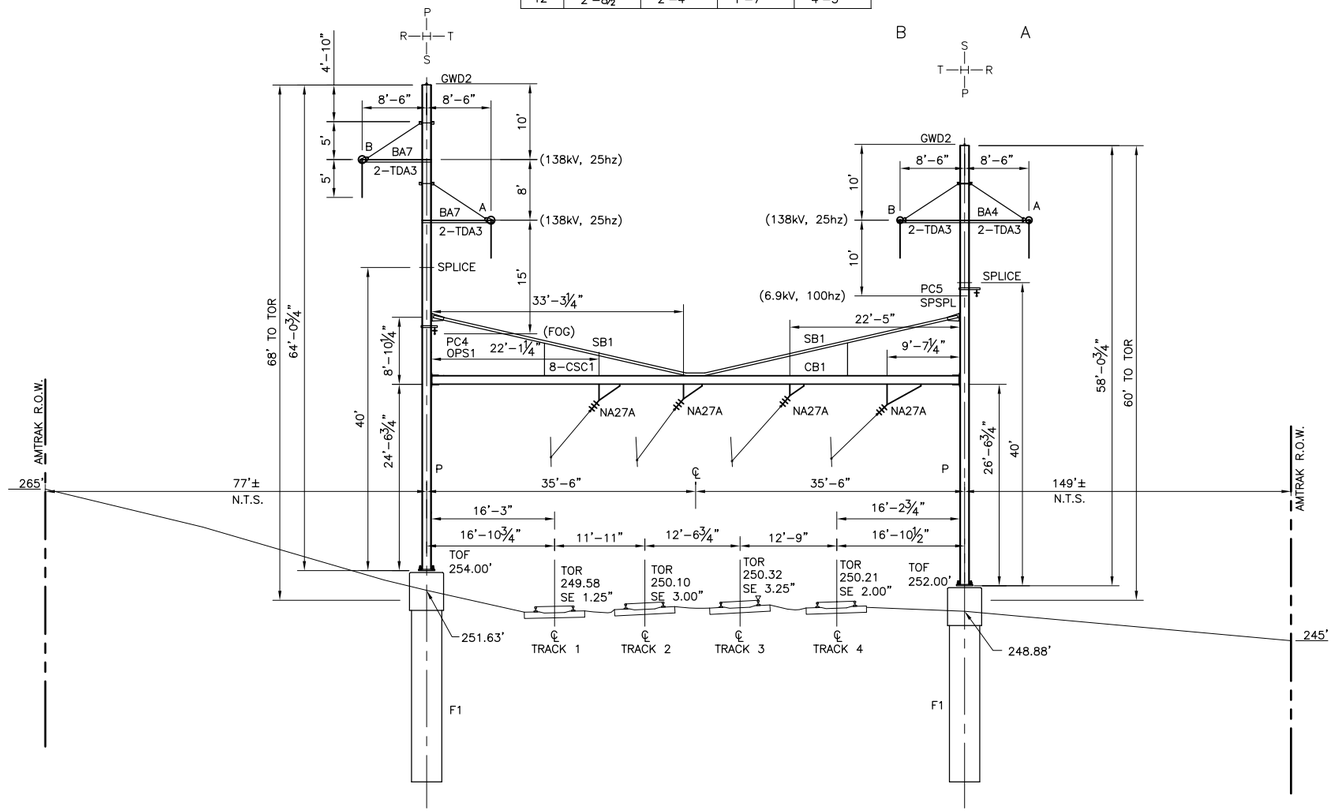
3/14/2016 4:26:57 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1508.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–8½"	25'–4¾"	25'–7¼"	24'–7¾"
CW	19'–7½"	18'–8¾"	18'–4½"	18'–9¾"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–3½"	1'–1"	8"	1'–10"
T2	2'–8½"	2'–4"	1'–7"	4'–5"

B A

TRANSPOSITION
T–147 TO T–142



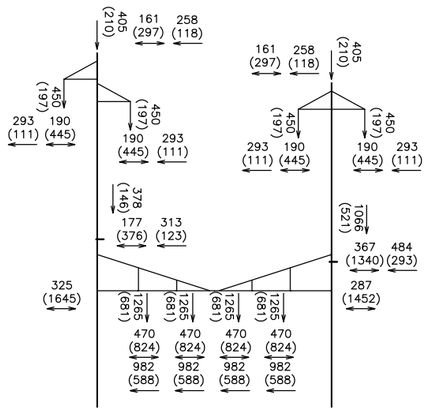
STRUCTURE ERECTION DIAGRAM T–147

325+85

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
GWD2	GROUND WIRE DEADEND	ET–1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	8
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
PC4	SLIDING CLAMP	S–5215	1
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA4	TRANSMISSION BRACKET	S–5203	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

4:27:05 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1509.dwg

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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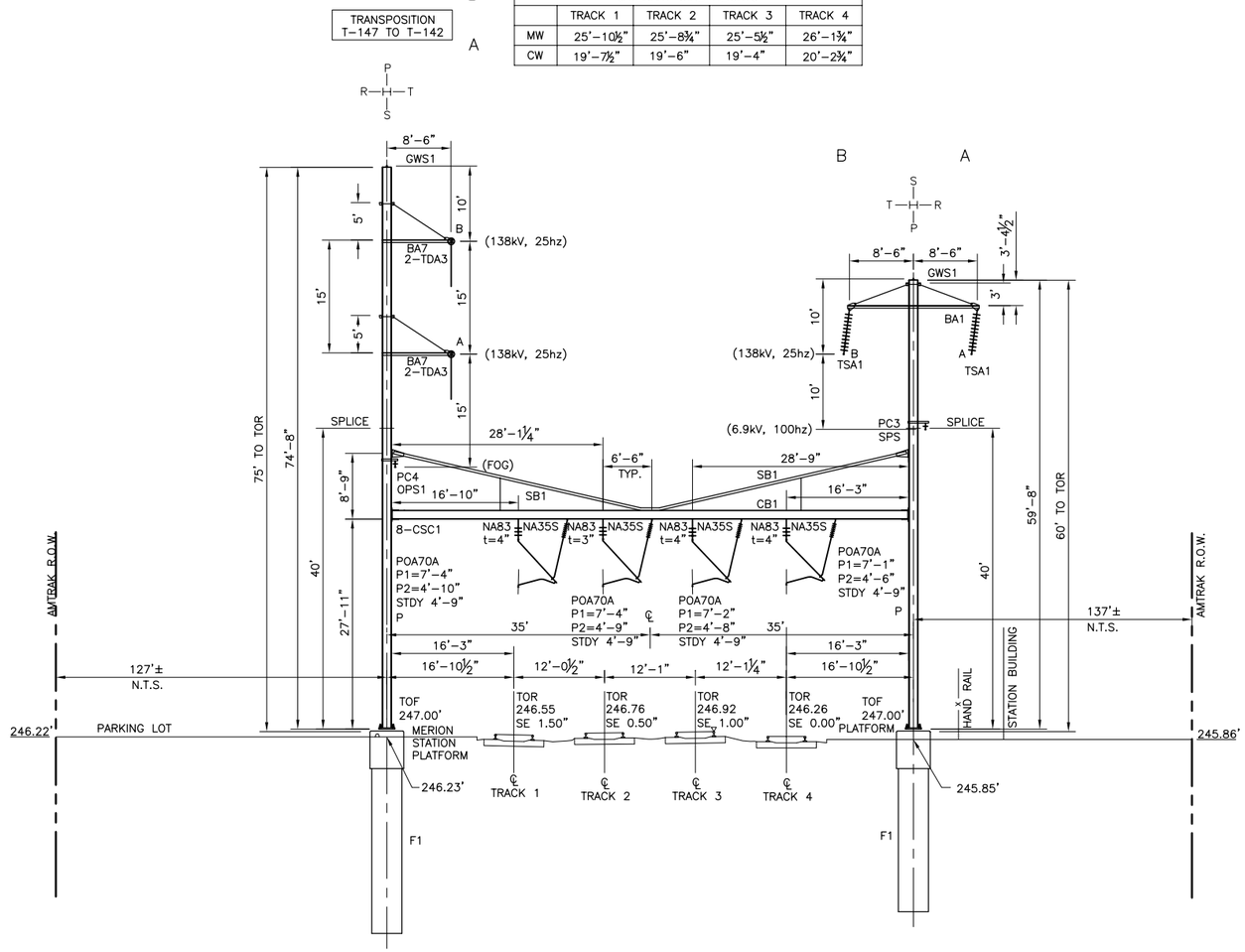
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–147

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1509.DWG
Ref. No.:	2011–059
Sheet No:	164 OF 347

ET–1509

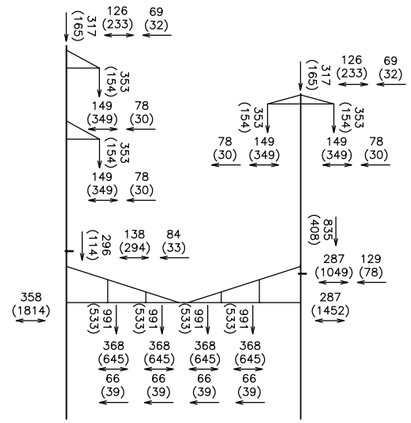
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–10½"	25'–8¾"	25'–5½"	26'–1¾"
CW	19'–7½"	19'–6"	19'–4"	20'–2¾"



STRUCTURE ERECTION DIAGRAM T–146

322+99
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
235' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–146

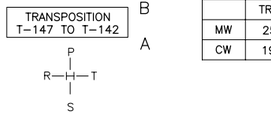
Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

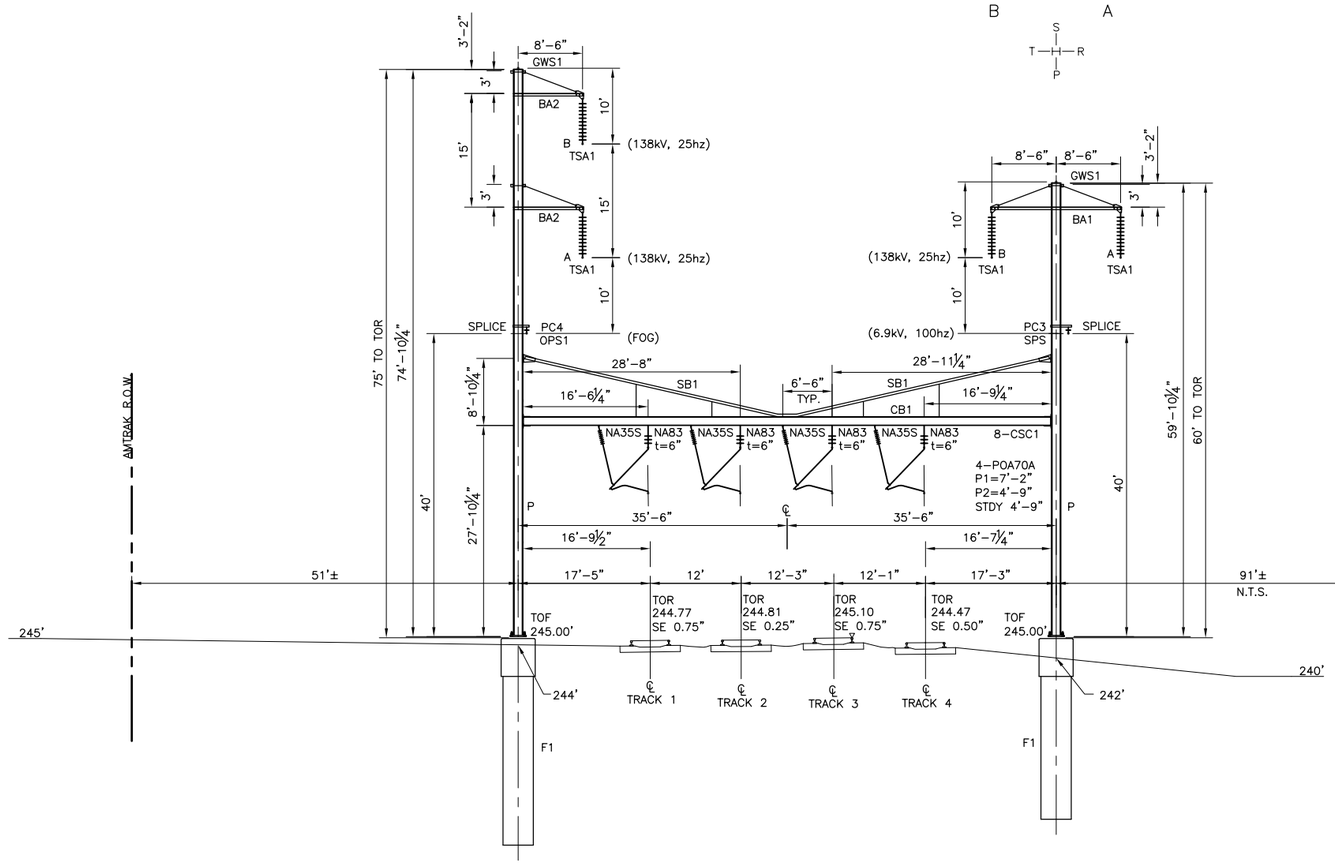
File No.:	2011–059–ET–1510.DWG
Ref. No.:	2011–059
Sheet No:	165 OF 347

ET–1510

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–5"	25'–4½"	25'–1"	24'–8¾"
CW	19'–5"	19'–4½"	19'–1"	18'–8¾"

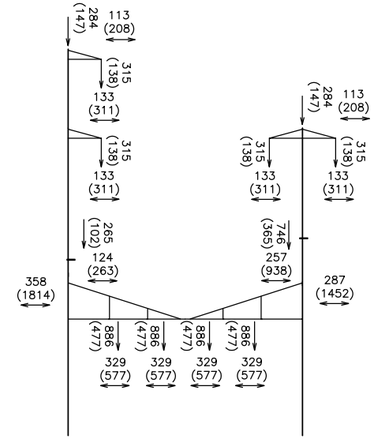




STRUCTURE ERECTION DIAGRAM T–145

321+19
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
210' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET – DOUBLE	S–5200	1
BA2	TRANSMISSION BRACKET – SINGLE	S–5201	2
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

4:27:19 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1511.dwg

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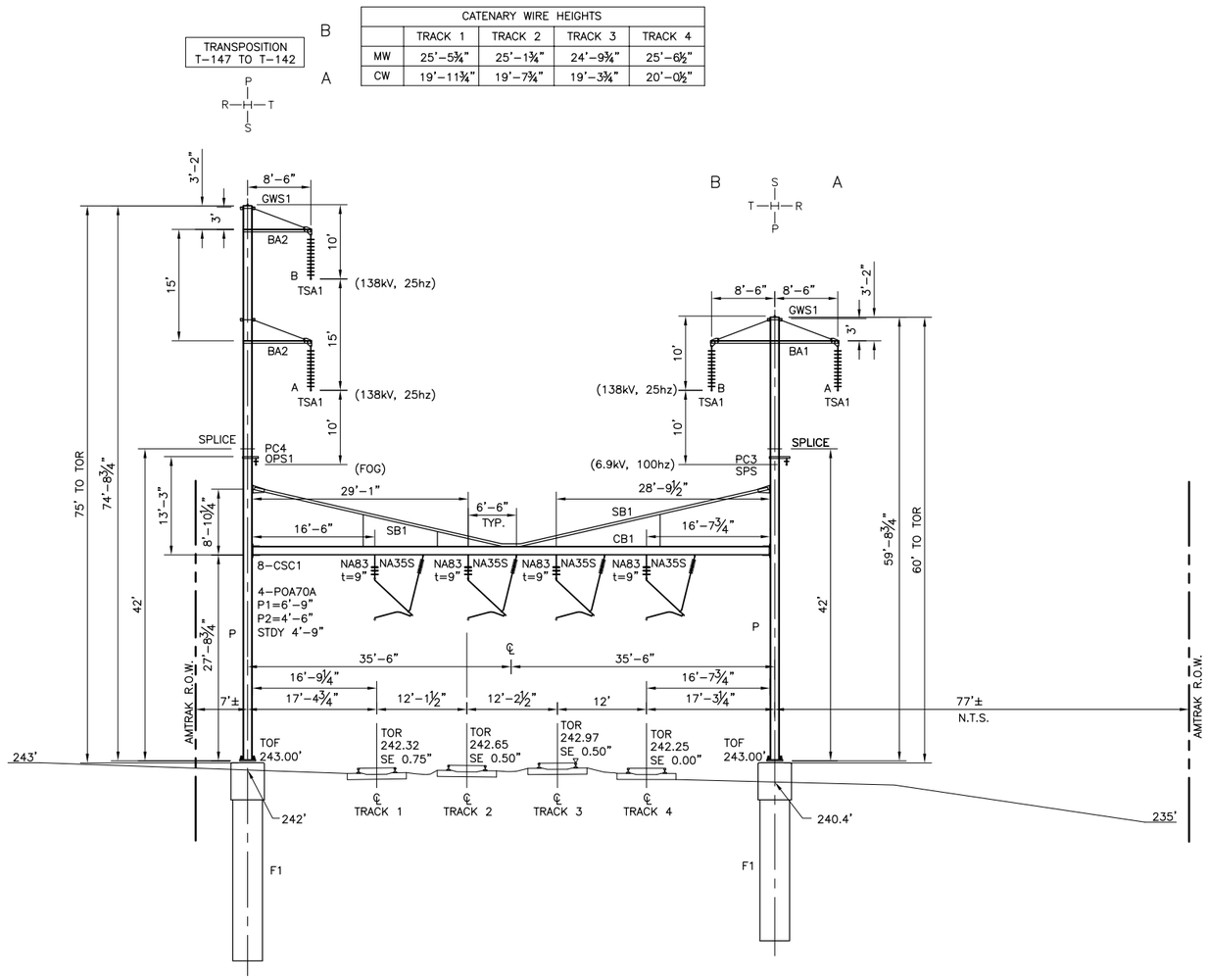
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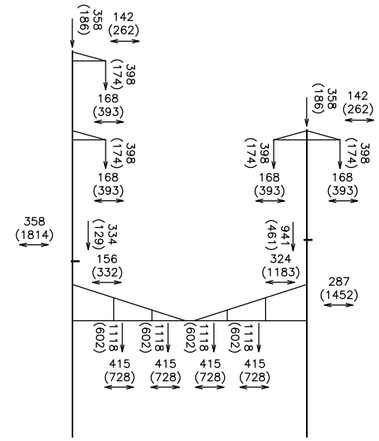
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–145

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1511.DWG
Ref. No.:	2011–059
Sheet No:	166 OF 347

ET–1511





LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
265' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA1	TRANSMISSION BRACKET - DOUBLE	S-5200	1
BA2	TRANSMISSION BRACKET - SINGLE	S-5201	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

STRUCTURE ERECTION DIAGRAM T-144

318+80
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-144

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1512.DWG
Ref. No.:	2011-059
Sheet No:	167 OF 347

ET-1512

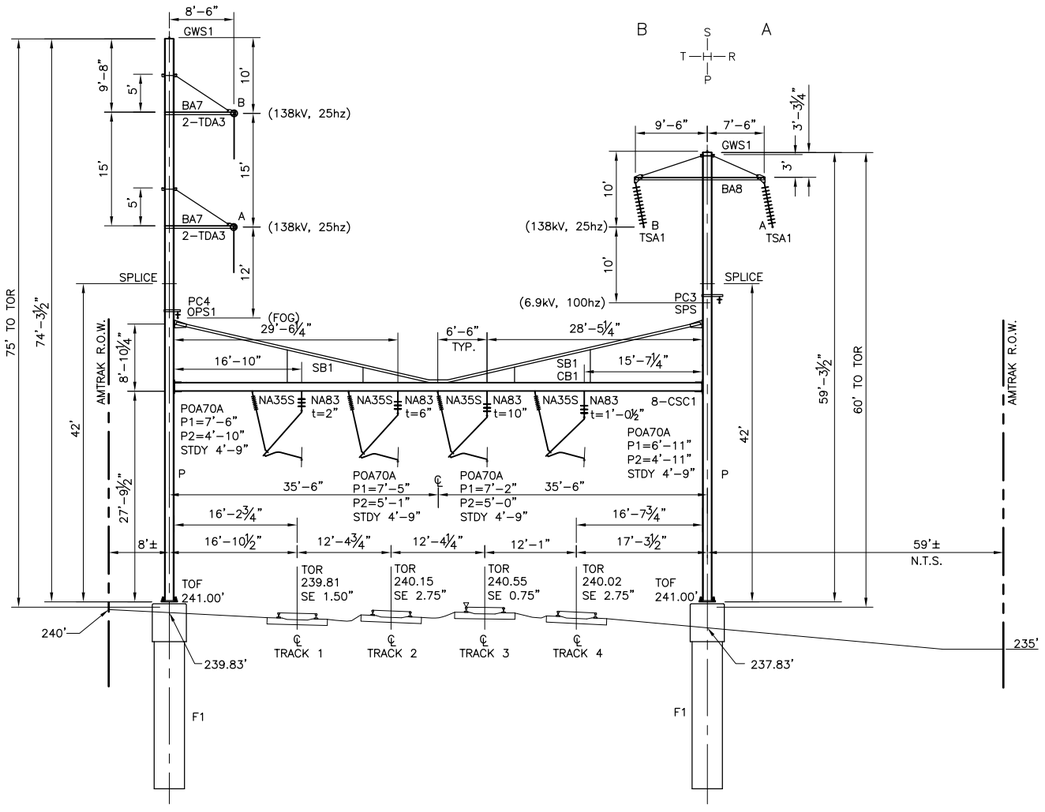
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TRANSPOSITION
T-147 TO T-142

P
R—H—T
S

B
A

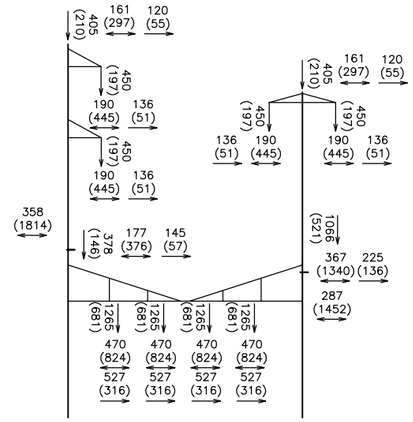
CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-8¼"	25'-11¾"	25'-3¼"	25'-7"
CW	20'-2½"	19'-7½"	19'-3½"	19'-11¼"



STRUCTURE ERECTION DIAGRAM T-143

315+90
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA8	TRANSMISSION BRACKET	S-5206	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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National Railroad Passenger Corporation
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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-143

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16	

File No.:	2011-059-ET-1513.DWG
Ref. No.:	2011-059
Sheet No:	168 OF 347

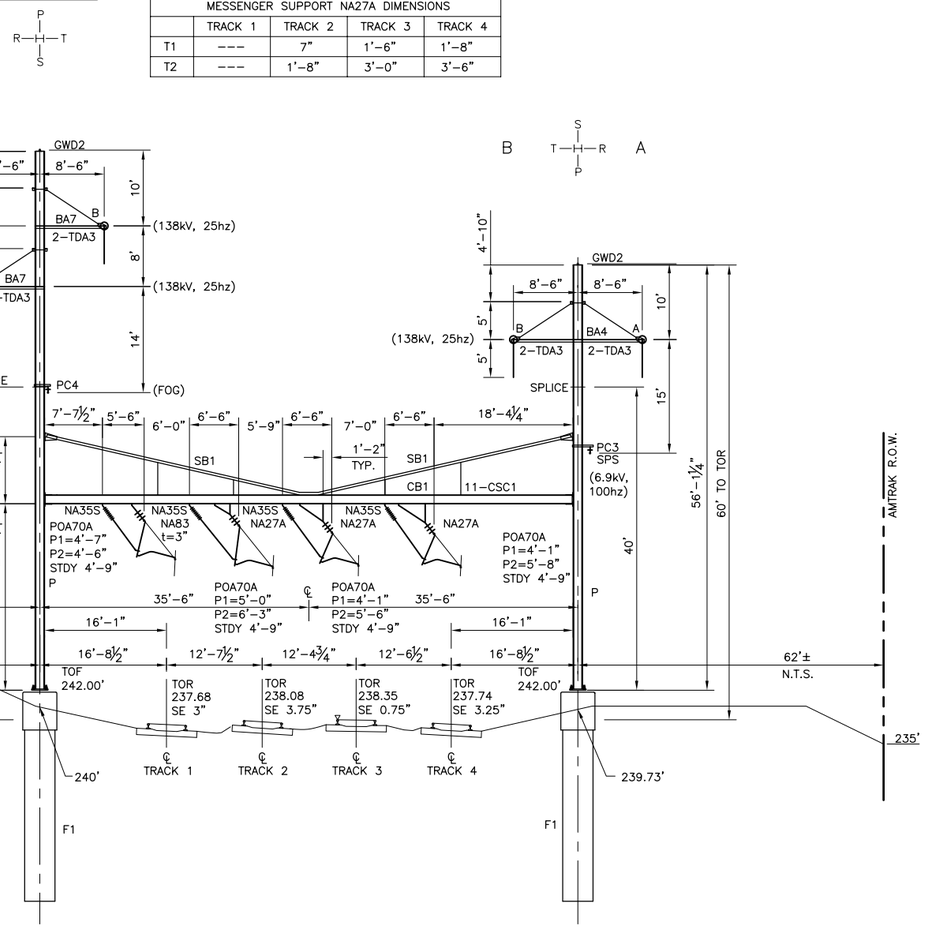
ET-1513

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'-9¾"	25'-9⅛"	24'-8½"	25'-0"
CW	21'-8¼"	20'-1¾"	20'-4"	20'-7"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	---	7"	1'-6"	1'-8"
T2	---	1'-8"	3'-0"	3'-6"

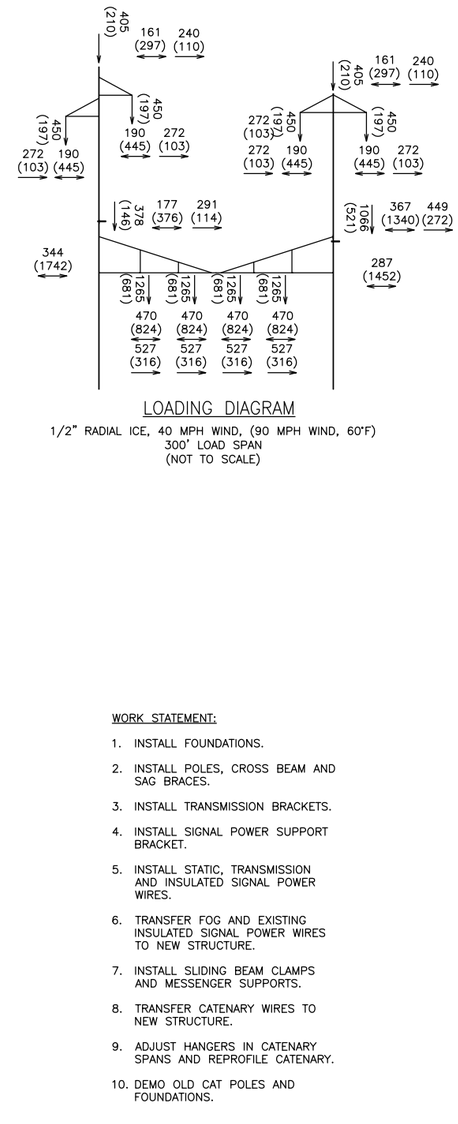
A TRANSPOSITION T-147 TO T-142 B



STRUCTURE ERECTION DIAGRAM T-142

313+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	3
NA83	MESSENGER SUPPORT	ET-1904	1
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWD2	GROUND WIRE DEADEND	ET-1909	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET	S-5203	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5214	11

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-142

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

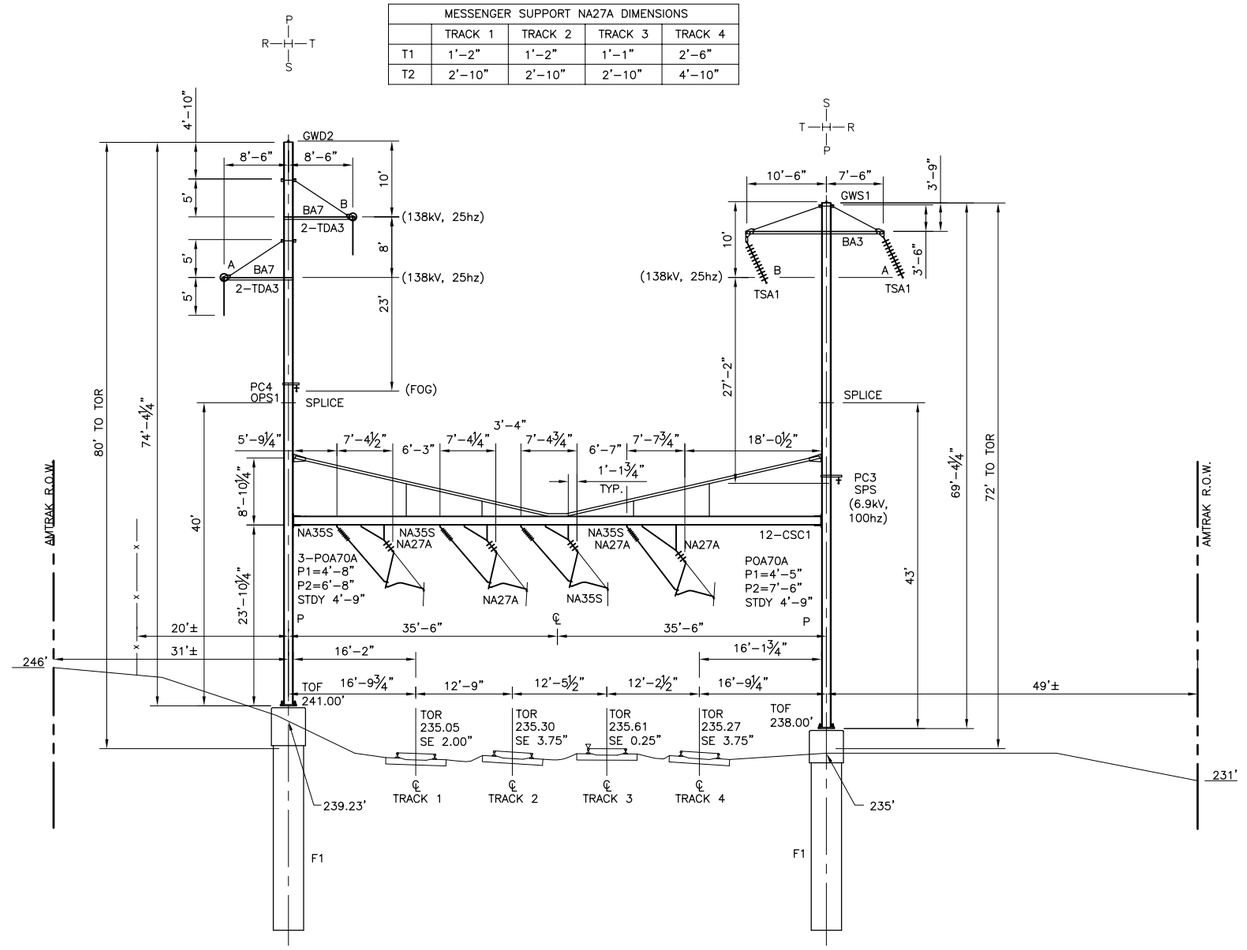
File No.:	2011-059-ET-1514.DWG
Ref. No.:	2011-059
Sheet No:	169 OF 347

ET-1514

3/14/2016 4:27:40 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-ET-1514.dwg

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–7½"	26'–3¾"	26'–1½"	25'–0¼"
CW	21'–5¼"	21'–1¼"	20'–11½"	20'–2¼"

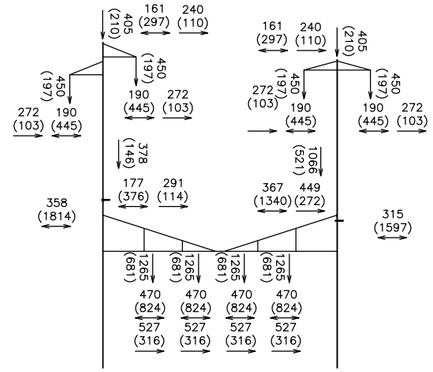
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–2"	1'–2"	1'–1"	2'–6"
T2	2'–10"	2'–10"	2'–10"	4'–10"



STRUCTURE ERECTION DIAGRAM T–141

310+05
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
GWD2	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1913	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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IN ASSOCIATION WITH Baker AECOM

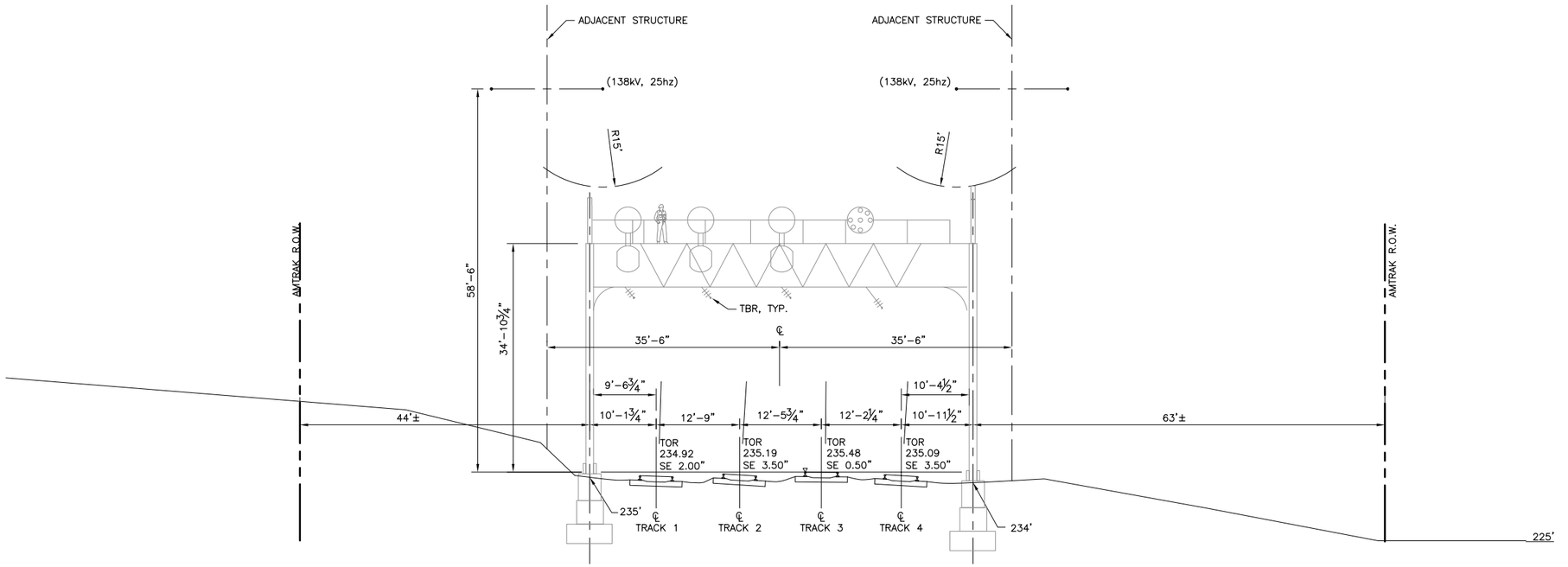
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–141

File No.:	2011–059–ET–1515.DWG
Ref. No.:	2011–059
Sheet No:	172 OF 347

ET–1515

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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WORK STATEMENT:

1. GROUND STRUCTURE.
2. REMOVE CATENARY SUPPORTS.

STRUCTURE ERECTION DIAGRAM T-140 SB (EXISTING P-12SB)

309+90
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-140 SB (P-12 SB)

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

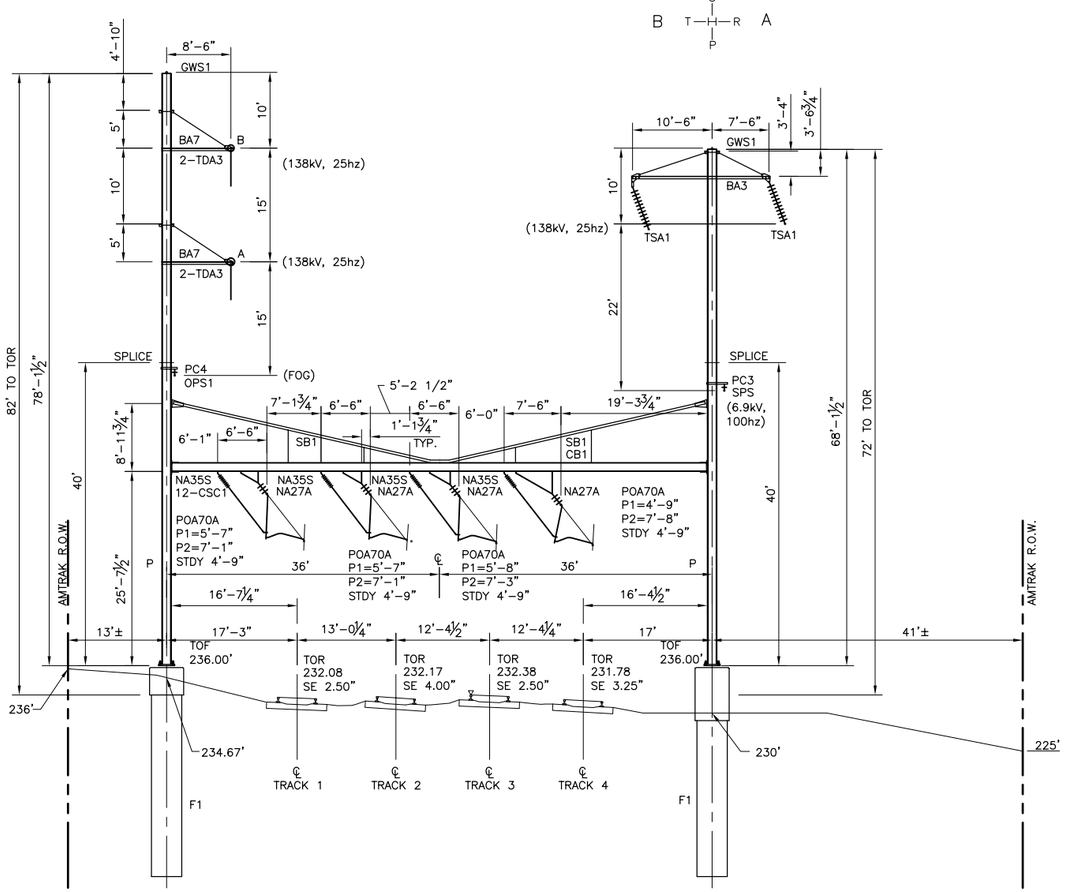
File No.:	2011-059-ET-1516.DWG
Ref. No.:	2011-059
Sheet No:	173 OF 347

ET-1516

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–10"	26'–8"	26'–3½"	25'–8¼"
CW	21'–1¼"	21'–0"	20'–6½"	20'–10½"

MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	9"	11"	2'–1"
T2	2'–0"	2'–2"	2'–5"	4'–10"



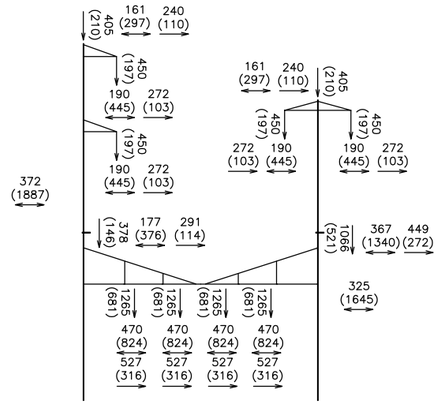
STRUCTURE ERECTION DIAGRAM T–139

307+00

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1913	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–139

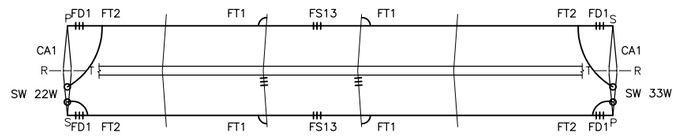
Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

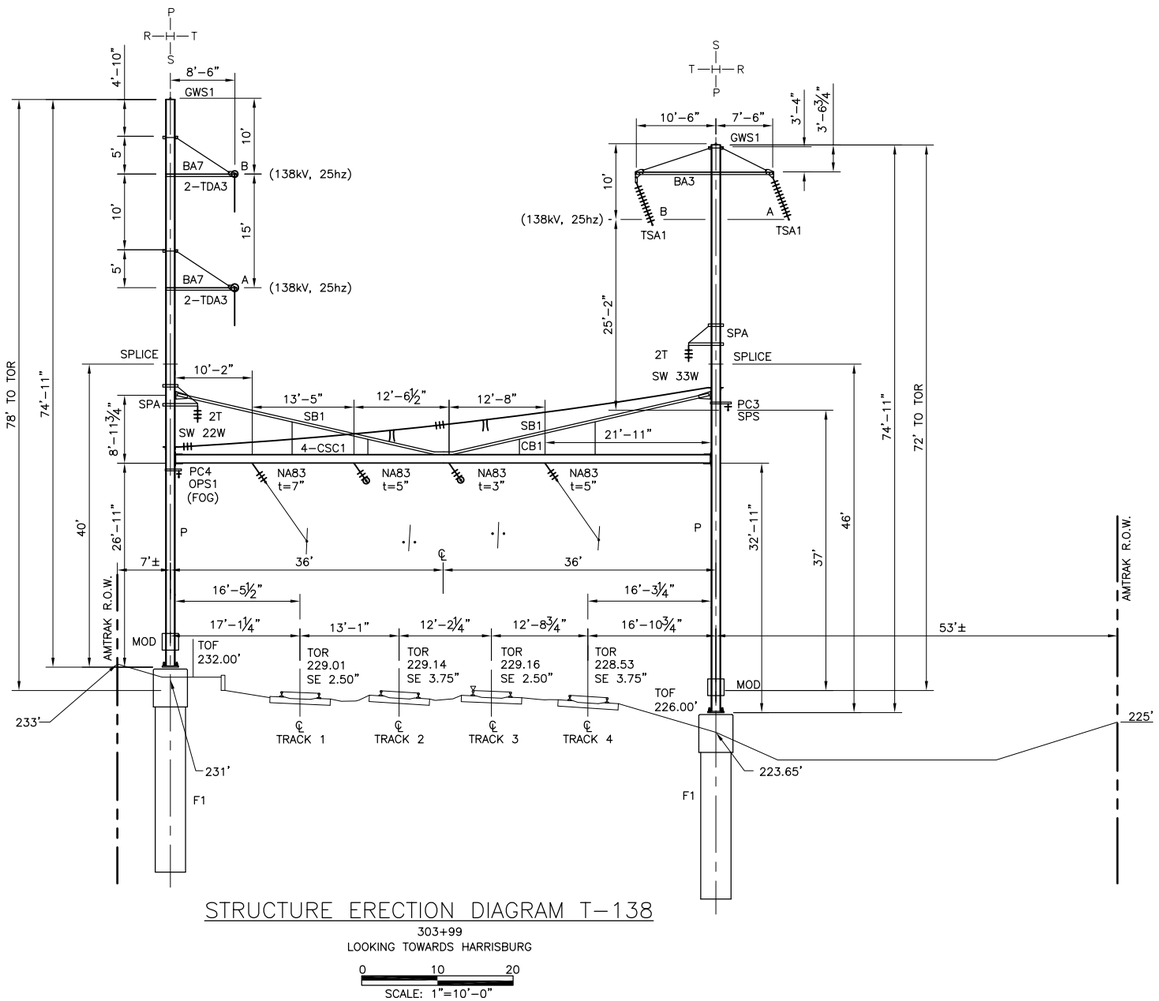
File No.:	2011–059–ET–1517.DWG
Ref. No.:	2011–059
Sheet No:	174 OF 347

ET–1517

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27'–8"	27'–8¾"	27'–9¾"	28'–5¼"
CW	19'–10¼"	19'–7⅛"	20'–8½"	20'–6"

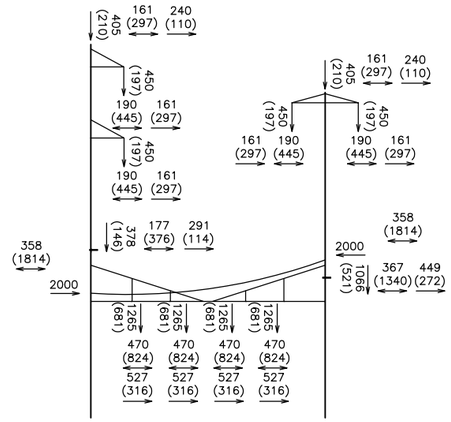




STRUCTURE ERECTION DIAGRAM T–138

303+99
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
CSC1	SLIDING BRACKET	S–5210	4

TEMPORARY MATERIAL (PRIOR TO WYNNFIELD INTERLOCKING CONSTRUCTION)			
SPA	SPIDER ARM	S–5213	2
CA1	FEEDER CROSS ARM	S–5212	2
SW	DISCONNECT SWITCH	ET–1910	2
MOD	MOTOR OPERATOR	ET–1910	2
2T	FEEDER SUPPORT	ET–1907	4
FD1	FEEDER DEADEND	ET–1907	4
FS13	FEEDER INSULATOR	ET–1907	2
FT1	FEEDER TAP	ET–1907	4
FT2	FEEDER TAP	ET–1907	4

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.
2. CROSS TRACK FEEDER AND DISCONNECT SWITCHES 22W AND 33W WILL BE REMOVED ONCE WYNNFIELD INTERLOCKING IS IN SERVICE.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–138

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

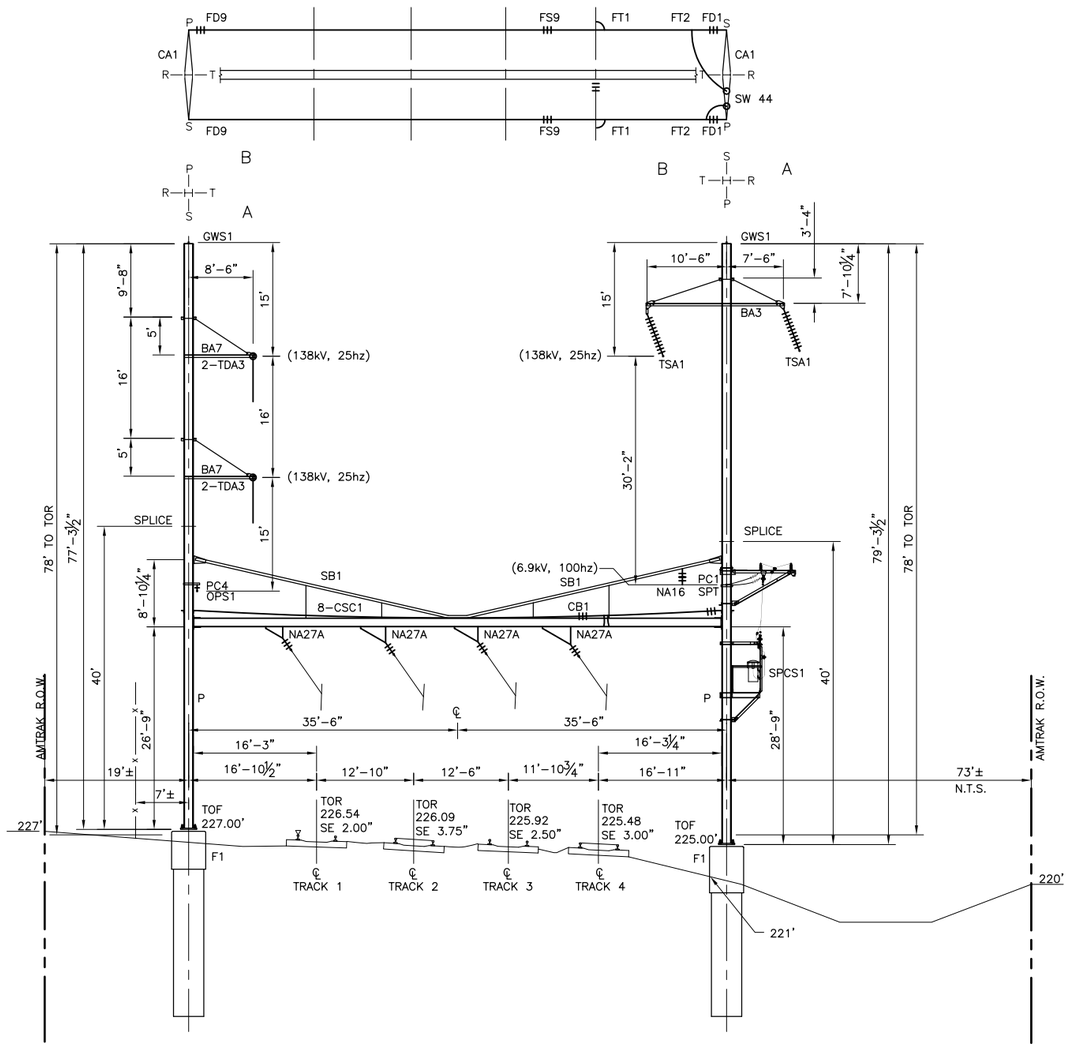
File No.:	2011–059–ET–1518.DWG
Ref. No.:	2011–059
Sheet No:	172 OF 347

ET–1518

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'-5¼"	24'-3¾"	24'-6¾"	24'-7¾"
CW	18'-7¾"	18'-8"	18'-11¾"	19'-4¾"

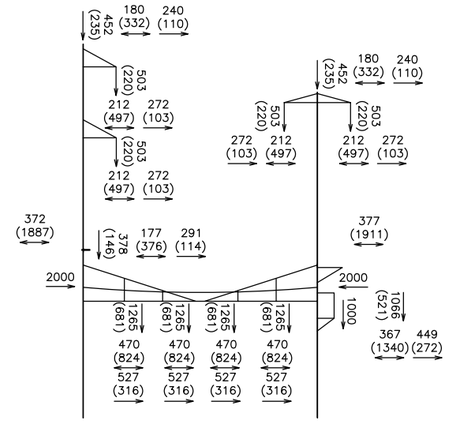
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	1'-3"	1'-2"	1'-6"
T2	1'-11"	3'-2"	2'-11"	3'-8"



STRUCTURE ERECTION DIAGRAM T-137

301+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
335' TRANSMISSION LOAD SPAN
300' CATENARY LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	4
SPCS1	SIGNAL POWER CUT SECTION	ET-1810	1
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPT	SIGNAL POWER TERMINATION	ET-1913	1
PC1	SLIDING CLAMP	S-5214	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA3	TRANSMISSION BRACKET	S-5202	1
BA7	TRANSMISSION BRACKET	S-5205	2
CSC1	SLIDING BRACKET	S-5212	8

TEMPORARY MATERIAL (PRIOR TO WYNNFIELD INTERLOCKING CONSTRUCTION)			
SPA	SPIDER ARM	S-5213	1
CA1	FEEDER CROSS ARM	S-5212	2
SW	DISCONNECT SWITCH	ET-1910	1
MOD	MOTOR OPERATOR	ET-1910	1
2T	FEEDER SUPPORT	ET-1907	2
FD1	FEEDER DEADEND	ET-1907	2
FD9	FEEDER DEADEND	ET-1907	2
FS9	FEEDER INSULATOR	ET-1907	2
FT1	FEEDER TAP	ET-1907	2
FT2	FEEDER TAP	ET-1907	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.
2. CROSS TRACK FEEDER AND DISCONNECT SWITCH 44 WILL BE REMOVED ONCE WYNNFIELD INTERLOCKING IS IN SERVICE.

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-137

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

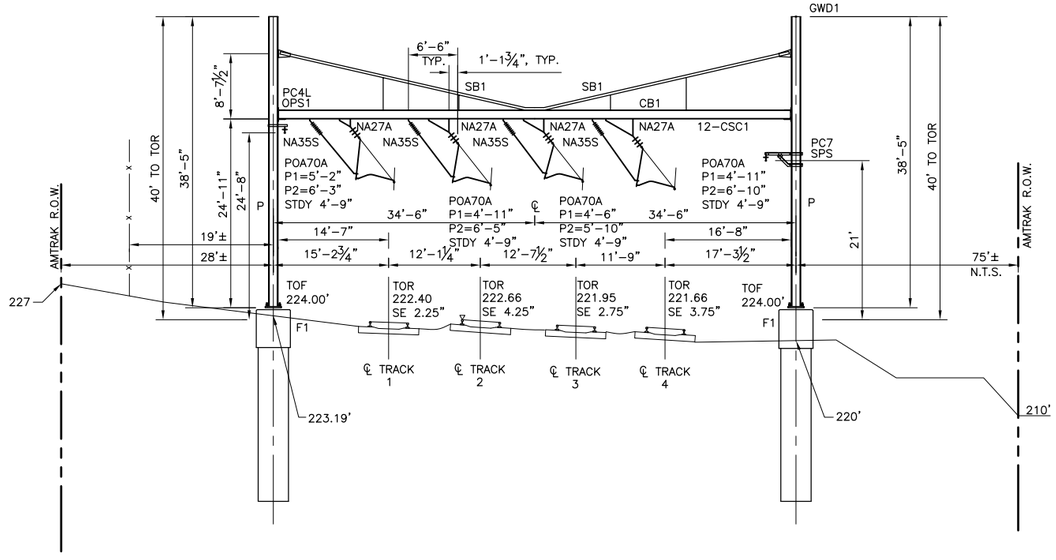
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Ref. No.:	2011-059
Sheet No:	173 OF 347

ET-1519

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	24'–3¾"	23'–3½"	24'–0"	23'–9¼"
CW	18'–5"	17'–9¼"	18'–11½"	18'–3¼"

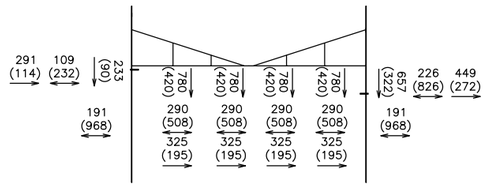
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	3"	11"	11"	1'–5"
T2	1'–0"	2'–5"	2'–5"	3'–6"



STRUCTURE ERECTION DIAGRAM T–136

298+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
185' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWD1	GROUND WIRE DEADEND	ET–1909	1
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC4	SLIDING CLAMP	S–5215	1
PC7	SLIDING BRACKET	S–5239	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
4. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
5. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
6. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.

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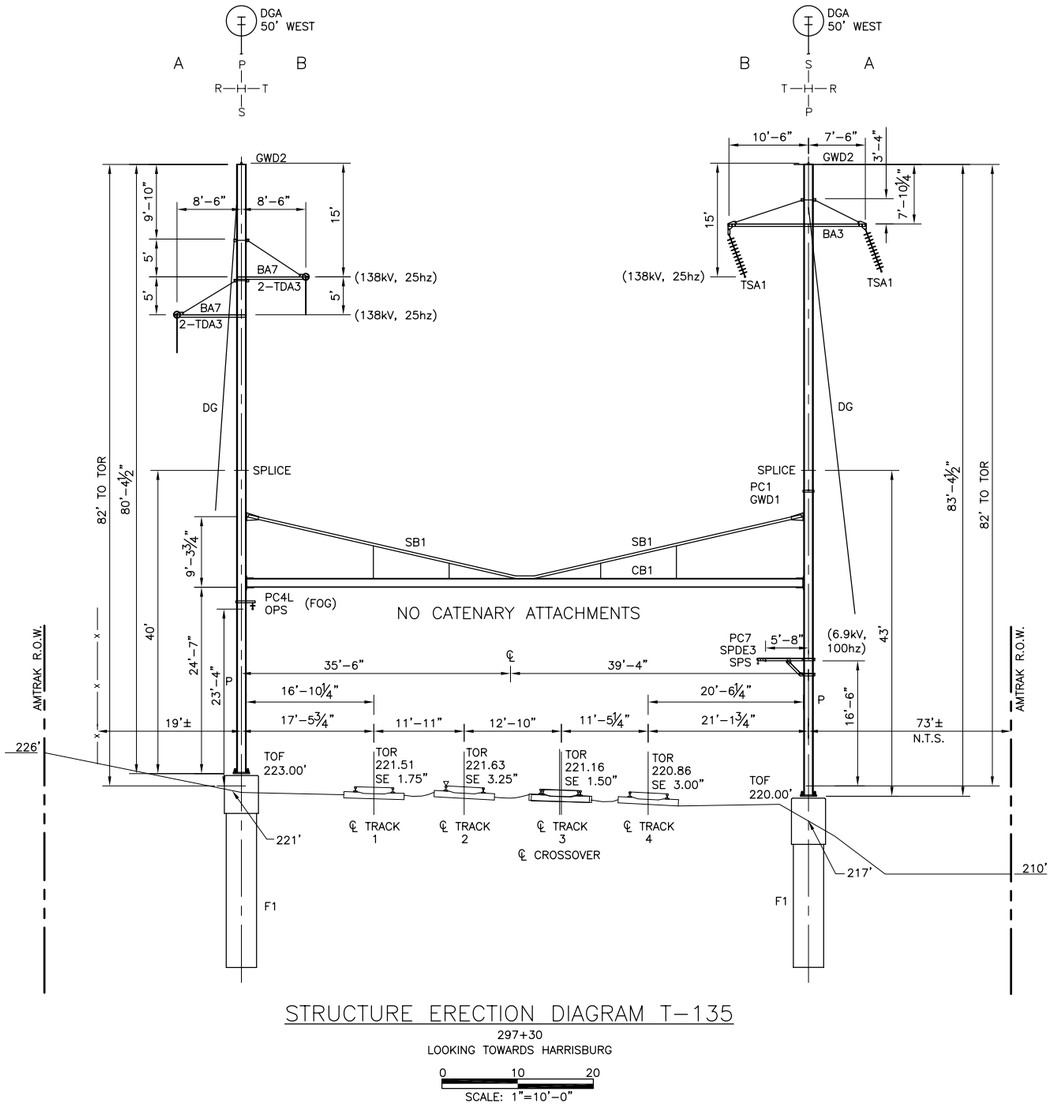
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–136

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1520.DWG
Ref. No.:	2011–059
Sheet No:	174 OF 347

ET–1520

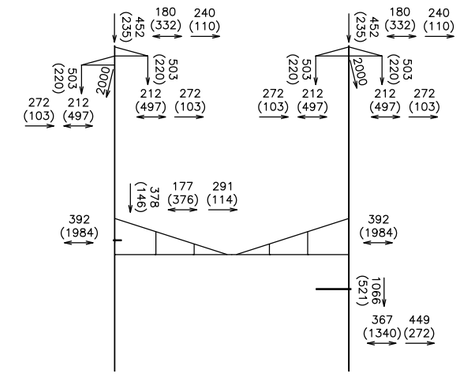
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STRUCTURE ERECTION DIAGRAM T–135

297+30
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
335' TRANSMISSION LOAD SPAN
300' CATENARY LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET–1909	2
GWD1	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	2
TDA3	TRANSMISSION WIRE DEADEND	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
SPDE3	SIGNAL POWER DEADEND	ET–1913	1
DG	DOWNGUY	ET–1908	2
PC1	SLIDING BRACKET	S–5214	1
PC7	SLIDING BRACKET	S–52xx	1
PC4L	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA7	TRANSMISSION BRACKET	S–5205	2
DGA	DOWNGUY ANCHOR	S–5101	2

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.

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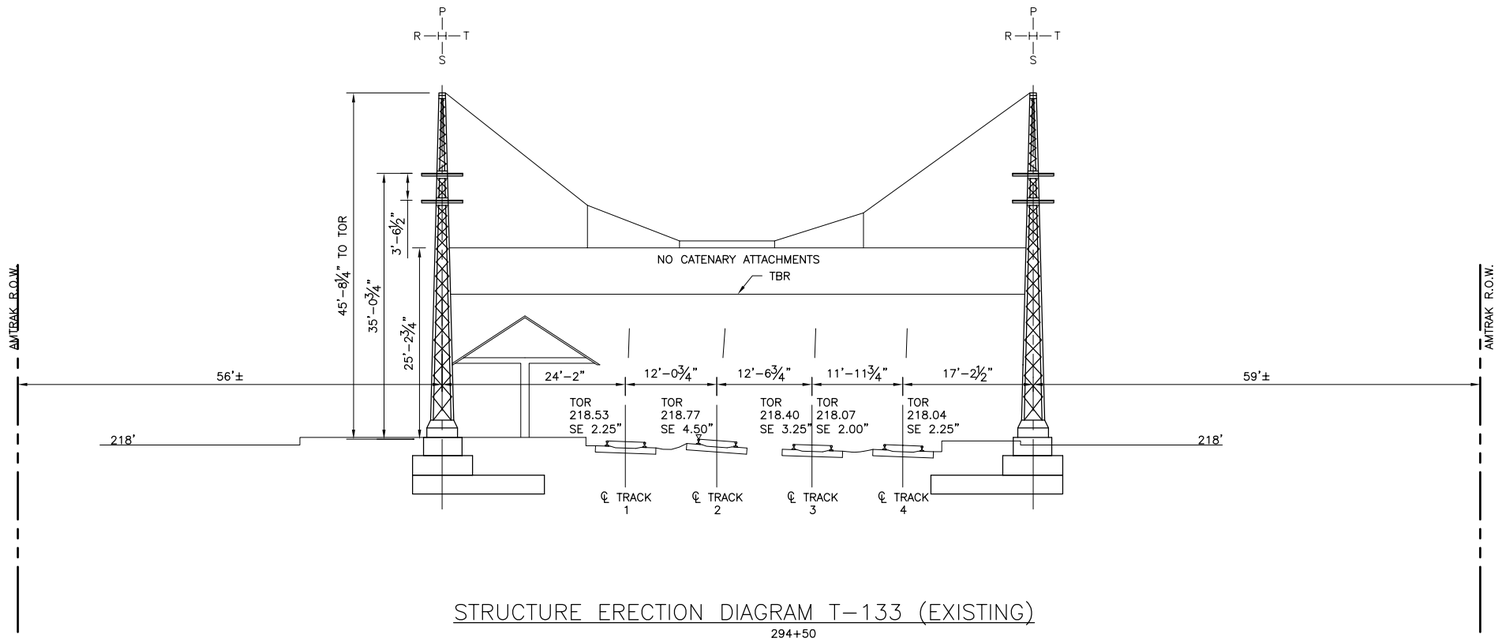
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–135

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1521.DWG
Ref. No.:	2011–059
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ET–1521

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STRUCTURE ERECTION DIAGRAM T–133 (EXISTING)

294+50

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"

WORK STATEMENT:

1. REMOVE EXISTING CATENARY SUPPORTS AND STEADY SPAN.

NOTES:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.
2. EXISTING STRUCTURE REMAINS FOR HISTORICAL PRESERVATION AT OVERBROOK STATION.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–133 (EXISTING)

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

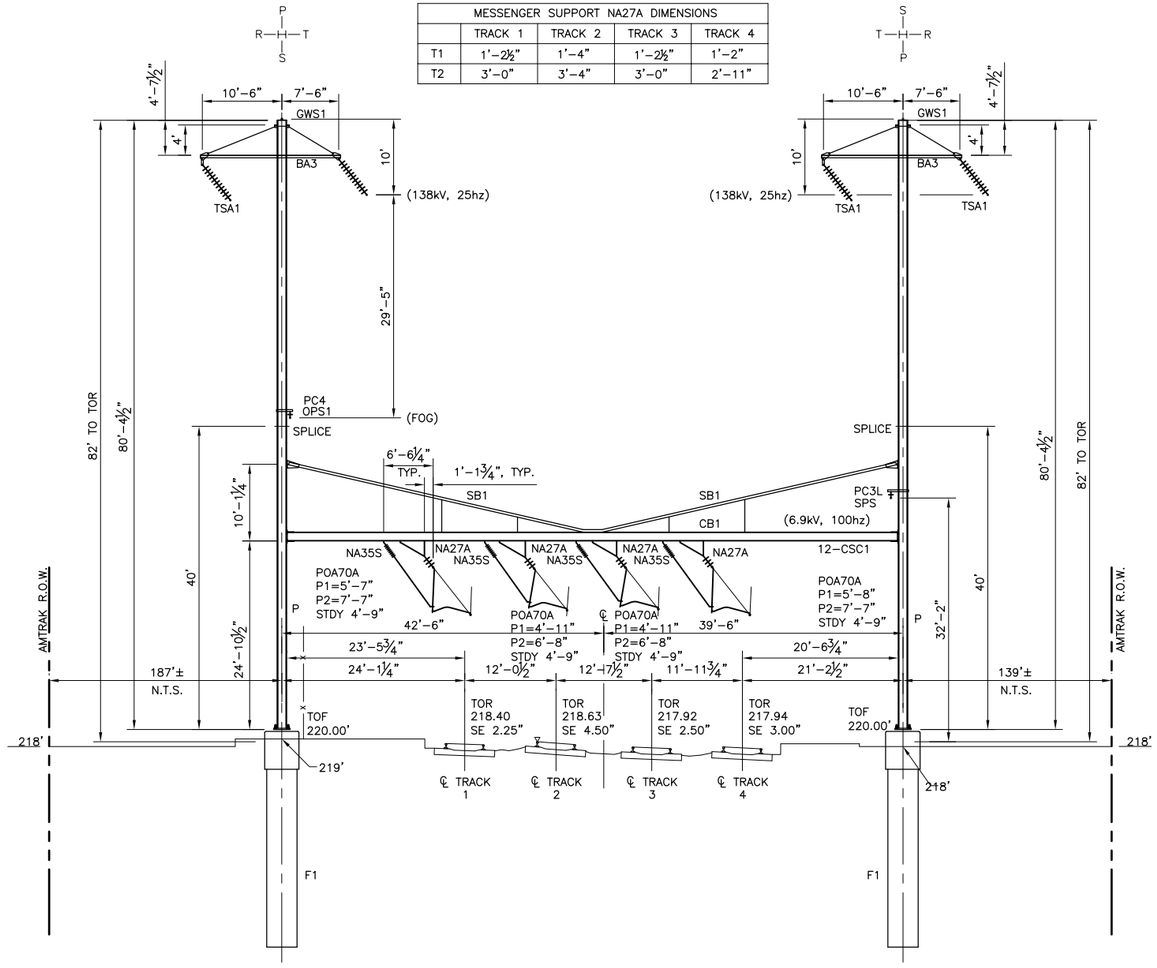
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Ref. No.:	2011–059
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	23'–3"	22'–10¼"	23'–8½"	23'–9"
CW	16'–11¾"	17'–4¼"	18'–2½"	17'–5¾"

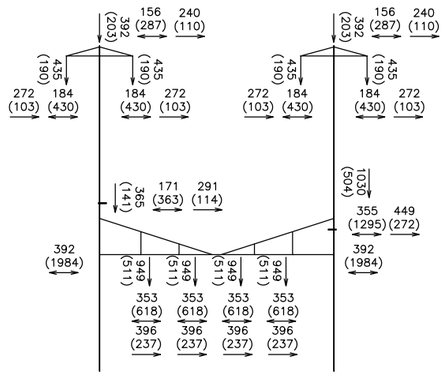
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–2½"	1'–4"	1'–2½"	1'–2"
T2	3'–0"	3'–4"	3'–0"	2'–11"



STRUCTURE ERECTION DIAGRAM T–132

294+37
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
290' TRANSMISSION LOAD SPAN
225' CATENARY LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE SUPPORT	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3L	SLIDING CLAMP	S–5215	1
PC4	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA4	TRANSMISSION BRACKET	S–5203	1
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTE:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–132

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

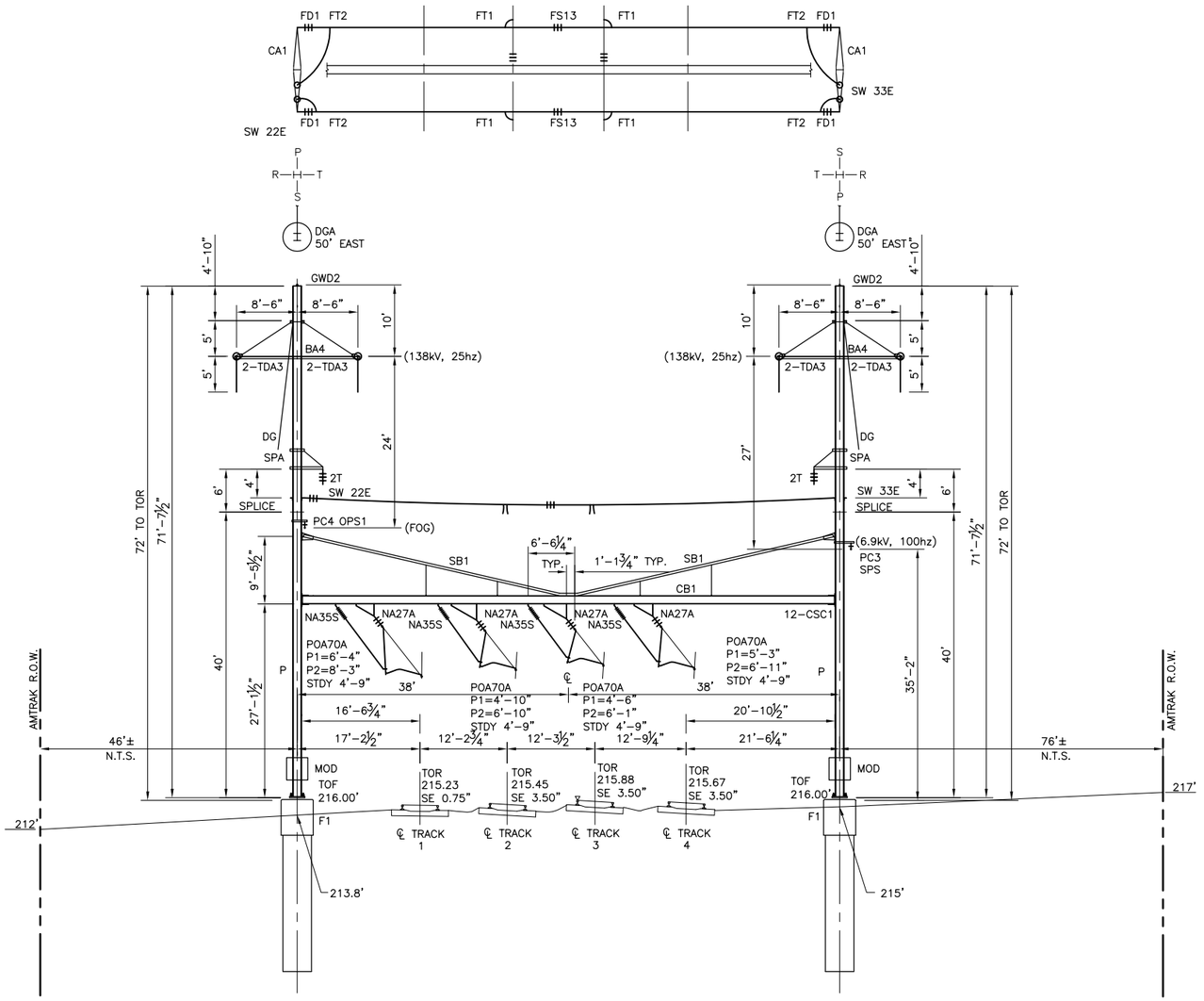
File No.:	2011–059–ET–1523.DWG
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ET–1523

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'-0"	24'-2½"	23'-11½"	24'-6½"
CW	18'-0"	18'-8½"	18'-10½"	18'-7"

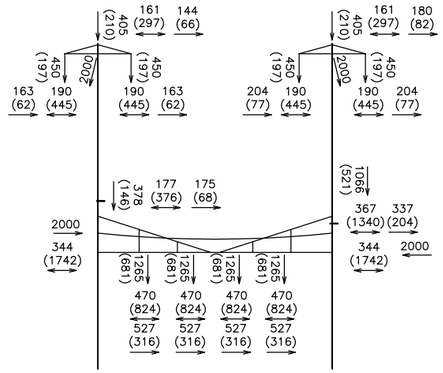
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	10"	1'-5"	1'-3"	11"
T2	2'-3"	3'-4"	3'-0"	2'-4"



STRUCTURE ERECTION DIAGRAM T-131

291+51
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
300' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWD2	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION WIRE SUPPORT	ET-1800	8
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
DG	DOWN GUY	ET-1908	2
PC3	SLIDING CLAMP	S-5215	1
PC4	SLIDING CLAMP	S-5215	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET	S-5203	2
CSC1	SLIDING BRACKET	S-5212	12
DGA	DOWN GUY ANCHOR	S-5101	2

TEMPORARY MATERIAL (PRIOR TO WYNNFIELD INTERLOCKING CONSTRUCTION)			
SPA	SPIDER ARM	S-5213	2
CA1	FEEDER CROSS ARM	S-5212	2
SW	DISCONNECT SWITCH	ET-1910	2
MOD	MOTOR OPERATOR	ET-1810	2
2T	FEEDER SUPPORT	ET-1907	4
FD1	FEEDER DEADEND	ET-1907	4
FS13	FEEDER INSULATOR	ET-1907	2
FT1	FEEDER TAP	ET-1907	4
FT2	FEEDER TAP	ET-1907	4

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. OVERBROOK INTERLOCKING WILL BE RETIRED ONCE WYNNFIELD INTERLOCKING IS BUILT.
2. CROSS TRACK FEEDER AND DISCONNECT SWITCHES 22E AND 33E WILL BE REMOVED ONCE WYNNFIELD INTERLOCKING IS IN SERVICE.

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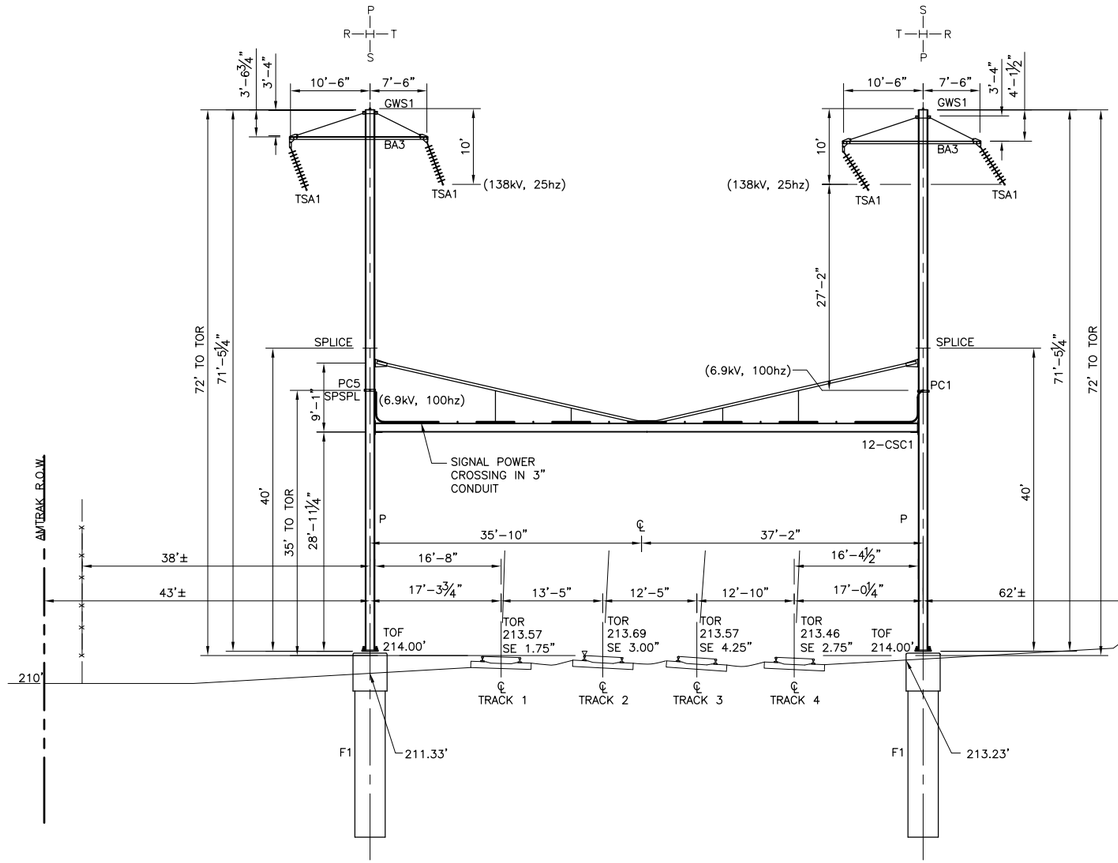
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-131

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1524.DWG
Ref. No.:	2011-059
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ET-1524

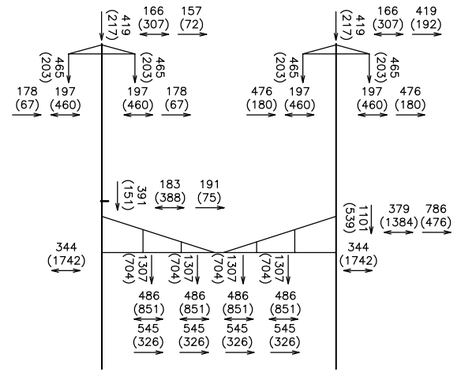
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STRUCTURE ERECTION DIAGRAM T-130

288+42
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
310' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
NA35S	INSULATOR ASSEMBLY	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
OPS1	FOG WIRE SUPPORT	ET-1906	1
SPSPL	SIGNAL POWER SPLICE	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC1	SLIDING CLAMP	S-5214	2
PC5	SLIDING CLAMP	S-5215	2
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA3	TRANSMISSION BRACKET	S-5202	2
CSC1	SLIDING BRACKET	S-5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

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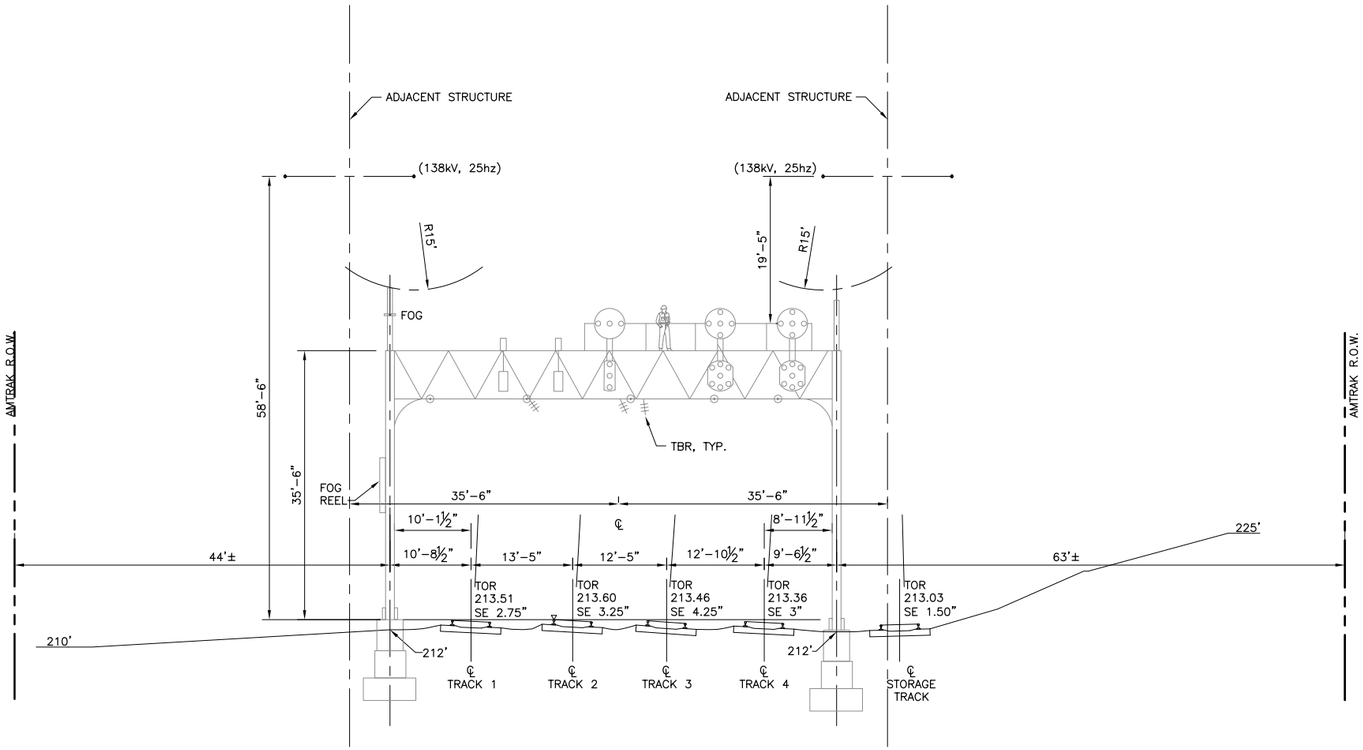
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-130

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1525.DWG
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STRUCTURE ERECTION DIAGRAM T-129 SB (EXISTING P-4SB)

288+30
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. REMOVE EXISTING CATENARY SUPPORTS.

NOTE:

1. FOG WIRE DEADENDS AT THIS STRUCTURE AND CONTINUES EAST UNDERGROUND.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-129 SB (P-4 SB)

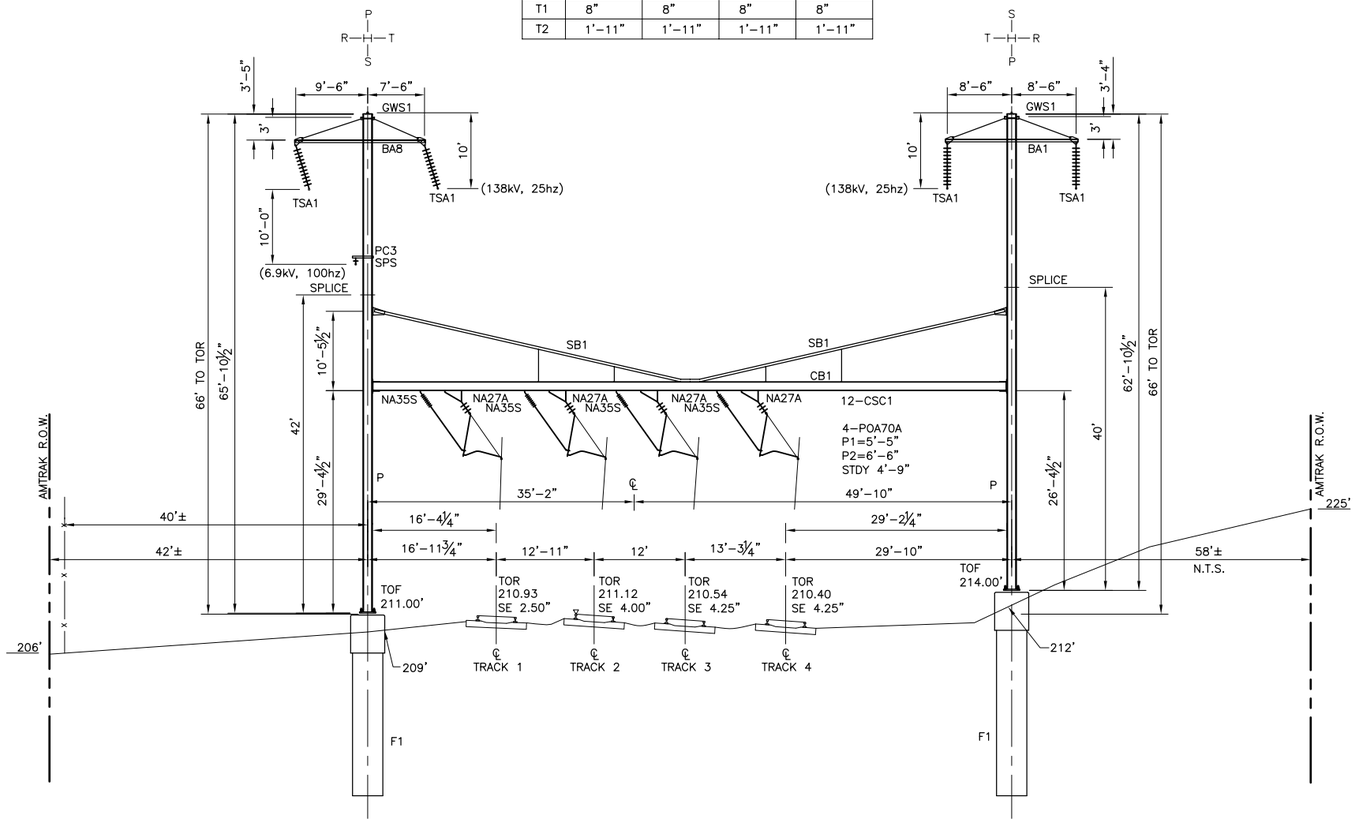
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File No.:	2011-059-ET-1526.DWG
Ref. No.:	2011-059
Sheet No:	183 OF 347

ET-1526

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–6"	26'–6"	26'–6"	26'–6"
CW	20'–6"	20'–6"	20'–6"	20'–6"

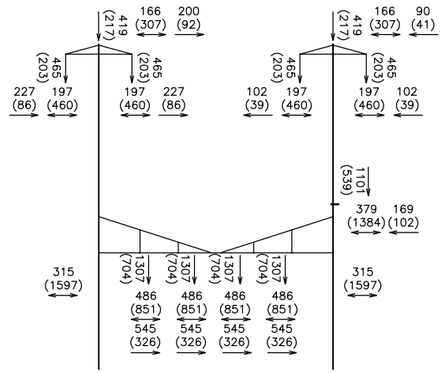
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	8"	8"	8"
T2	1'–11"	1'–11"	1'–11"	1'–11"



STRUCTURE ERECTION DIAGRAM T–128

285+31
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
310' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	1
BA8	TRANSMISSION BRACKET	S–5206	1
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–6" ABOVE TRACK 2.

100% DESIGN SUBMISSION

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IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–128

File No.:	2011–059–ET–1527.DWG
Ref. No.:	2011–059
Sheet No:	184 OF 347

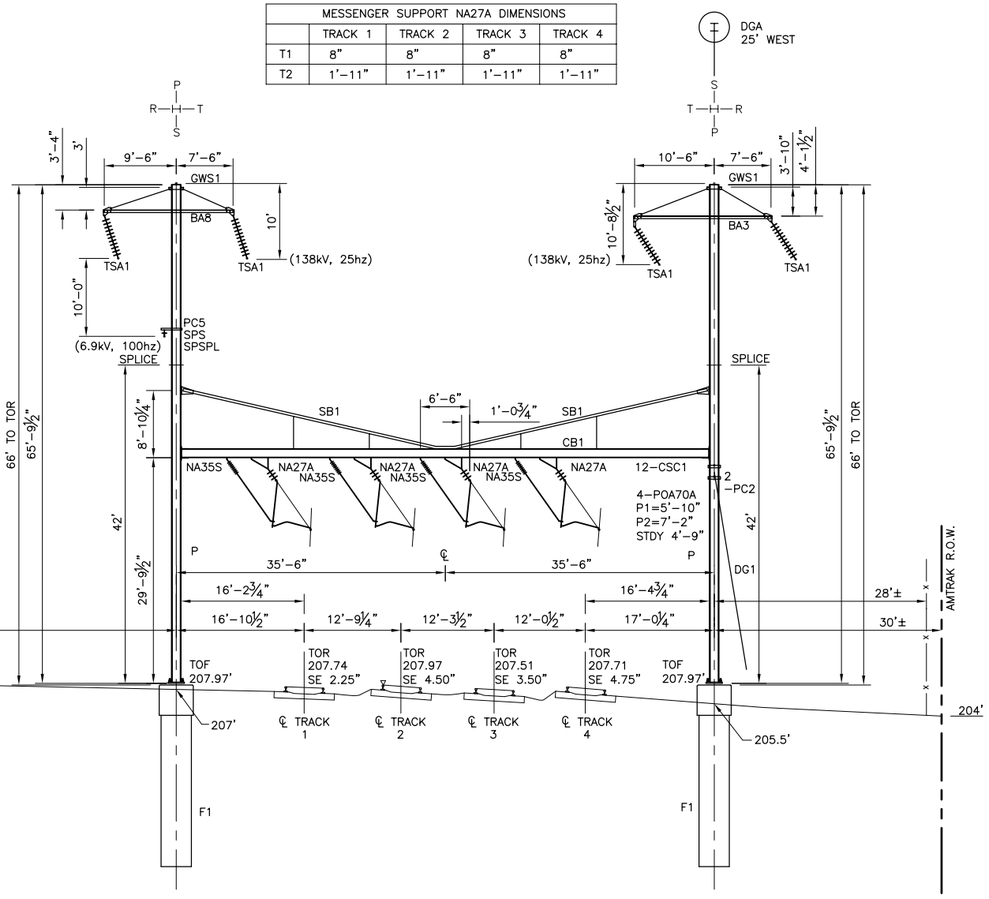
ET–1527

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	27–0"	27'–0"	27'–0"	27'–0"
CW	20'–6"	20'–6"	20'–6"	20'–6"

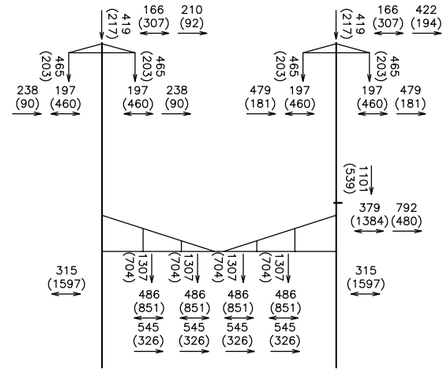
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	8"	8"	8"
T2	1'–11"	1'–11"	1'–11"	1'–11"



STRUCTURE ERECTION DIAGRAM T–127

282+20
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
310' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWNGUY	ET–1908	1
PC2	SLIDING CLAMP	S–5214	2
PC5	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA8	TRANSMISSION BRACKET	S–5203	1
CSC1	SLIDING BRACKET	S–5214	12
DGA	DOWNGUY ANCHOR	S–5101	1

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 30'–0" ABOVE TRACK 2.
3. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 2.

100% DESIGN SUBMISSION

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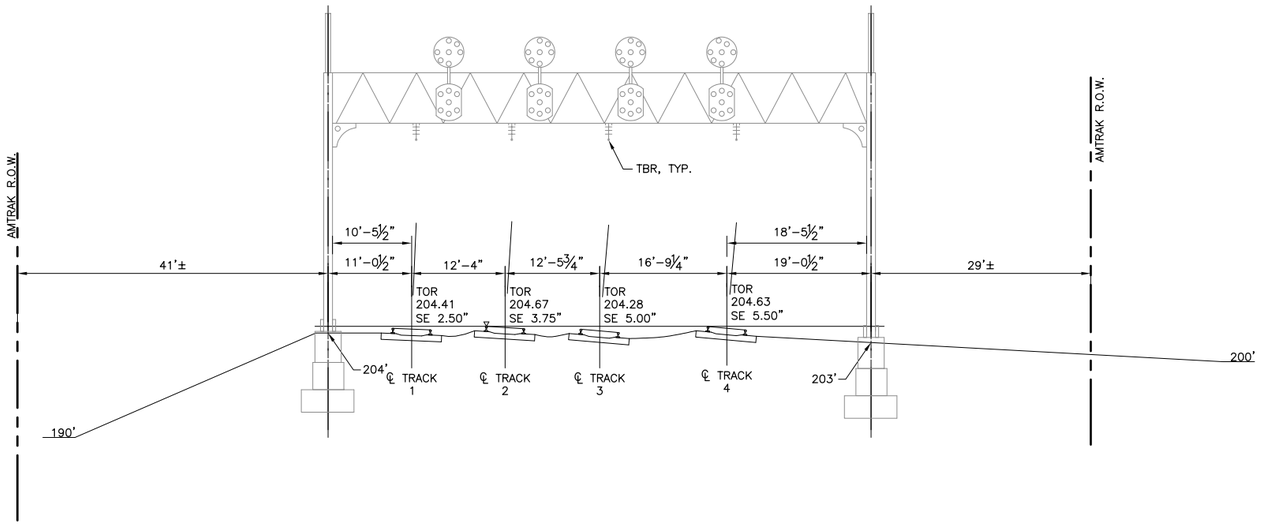
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–127

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1528.DWG
Ref. No.:	2011–059
Sheet No:	185 OF 347

ET–1528

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WORK STATEMENT:

1. REMOVE EXISTING CATENARY SUPPORTS.

STRUCTURE ERECTION DIAGRAM T-126 SB (EXISTING P-1A SB)

279+40
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-126 SB (P-1A SB)

File No.:	2011-059-ET-1529.DWG
Ref. No.:	2011-059
Sheet No:	186 OF 347

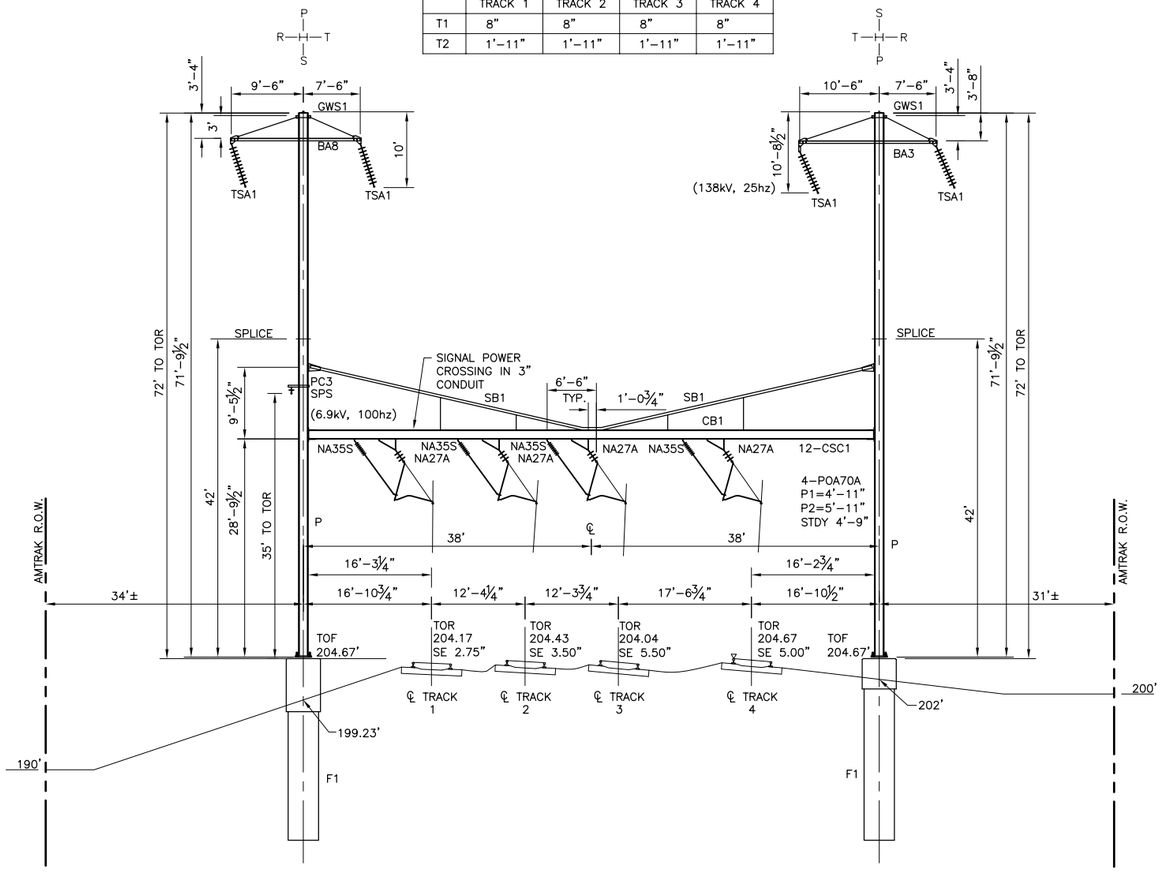
ET-1529

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26–0"	26'–0"	26'–0"	26'–0"
CW	20'–6"	20'–6"	20'–6"	20'–6"

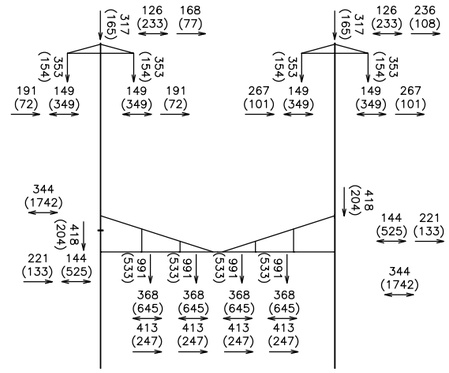
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	8"	8"	8"	8"
T2	1'–11"	1'–11"	1'–11"	1'–11"



STRUCTURE ERECTION DIAGRAM T–125

279+20
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
235' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5215	2
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	2
CSC1	SLIDING BRACKET	S–5214	12

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–0" ABOVE TRACK 4.
3. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 4.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–125

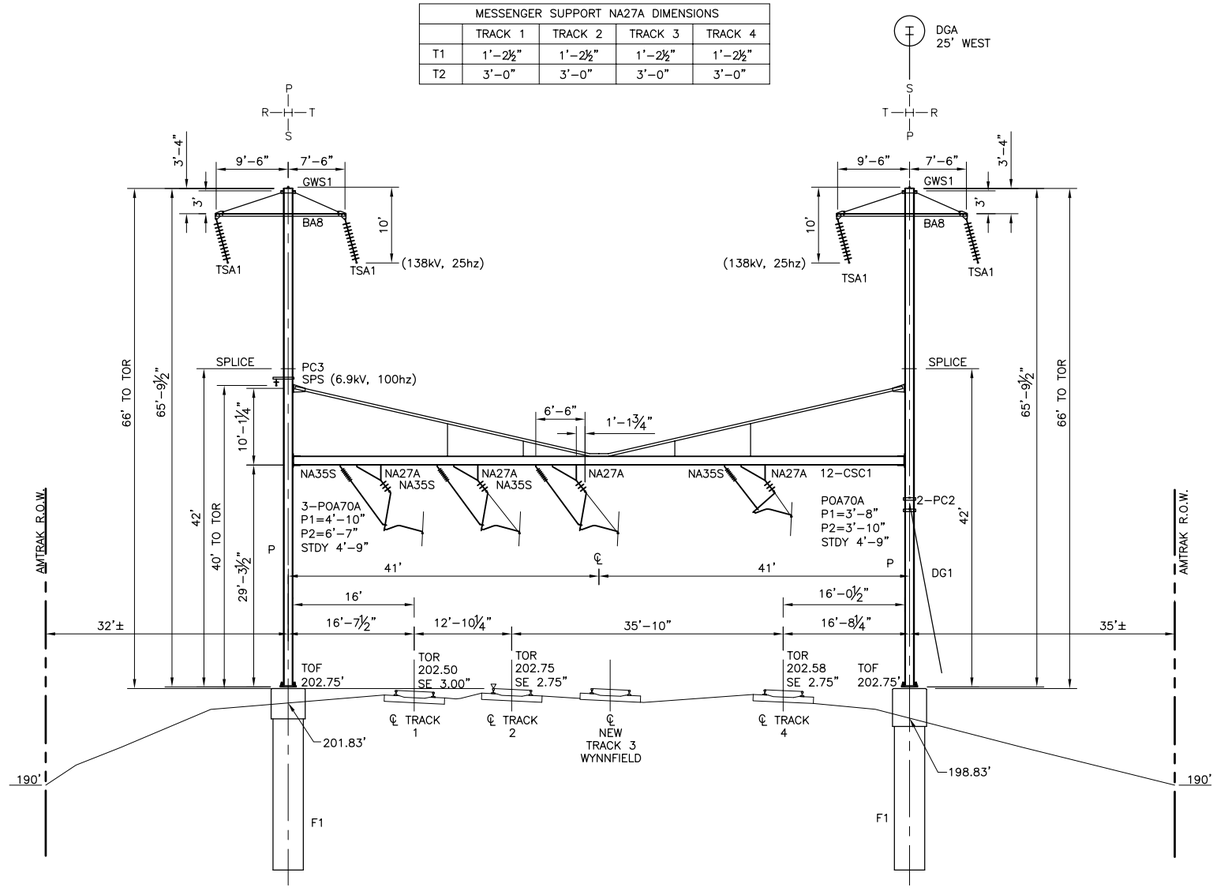
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1530.DWG
Ref. No.:	2011–059
Sheet No:	187 OF 347

ET–1530

CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–0"	26'–0"	26'–0"	26'–2½"
CW	20'–6"	20'–6"	20'–6"	22'–10"

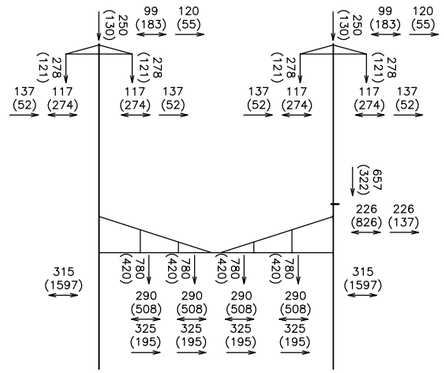
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–2½"	1'–2½"	1'–2½"	1'–2½"
T2	3'–0"	3'–0"	3'–0"	3'–0"



STRUCTURE ERECTION DIAGRAM T–124

277+53
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
185' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET–1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
OPS1	FOG WIRE SUPPORT	ET–1906	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
DG1	DOWN GUY	ET–1908	1
PC2	SLIDING CLAMP	S–5214	2
PC3	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA3	TRANSMISSION BRACKET	S–5202	1
BA4	TRANSMISSION BRACKET	S–5203	1
CSC1	SLIDING BRACKET	S–5214	12
DGA	DOWN GUY ANCHOR	S–5101	1

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–6" ABOVE TRACK 2.
3. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 2.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–124

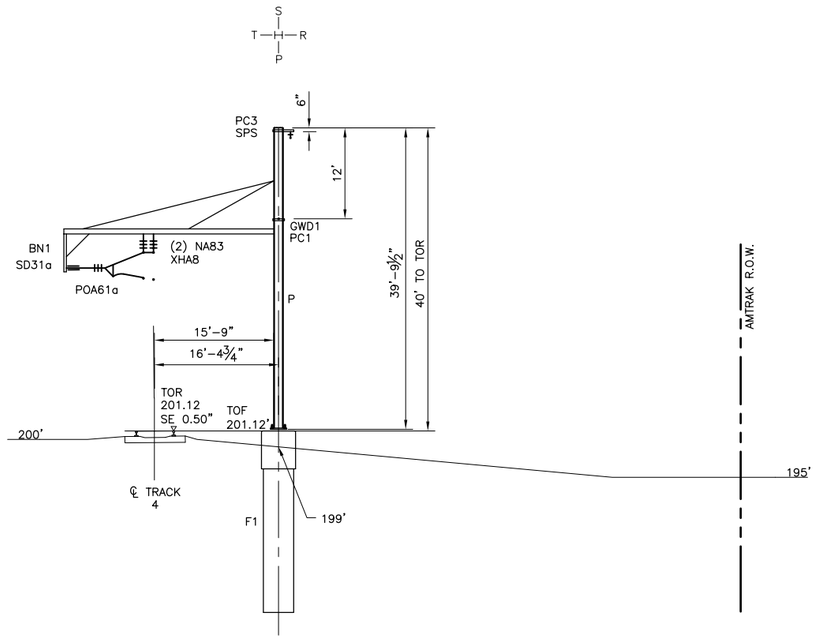
File No.:	2011–059–ET–1531.DWG
Ref. No.:	2011–059
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ET–1531

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	2
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
POA61a	PULL OFF ASSEMBLY	ET–1903	1
SD31a	PULL OFF ASSEMBLY	ET–1914	1
XHA8	SPREADER ASSEMBLY	ET–1901	1
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
PC3	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
–	CANTILEVER ARM	S–	1
BN1	DROPPPER BRACKET	S–	1



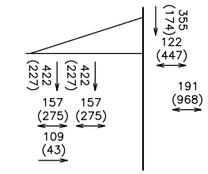
STRUCTURE ERECTION DIAGRAM T–123

276+27

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
100' LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE AND CANTILEVER ARM.
3. INSTALL GROUND WIRE.
4. INSTALL MESSENGER SUPPORTS AND PULLOFF ASSEMBLIES.

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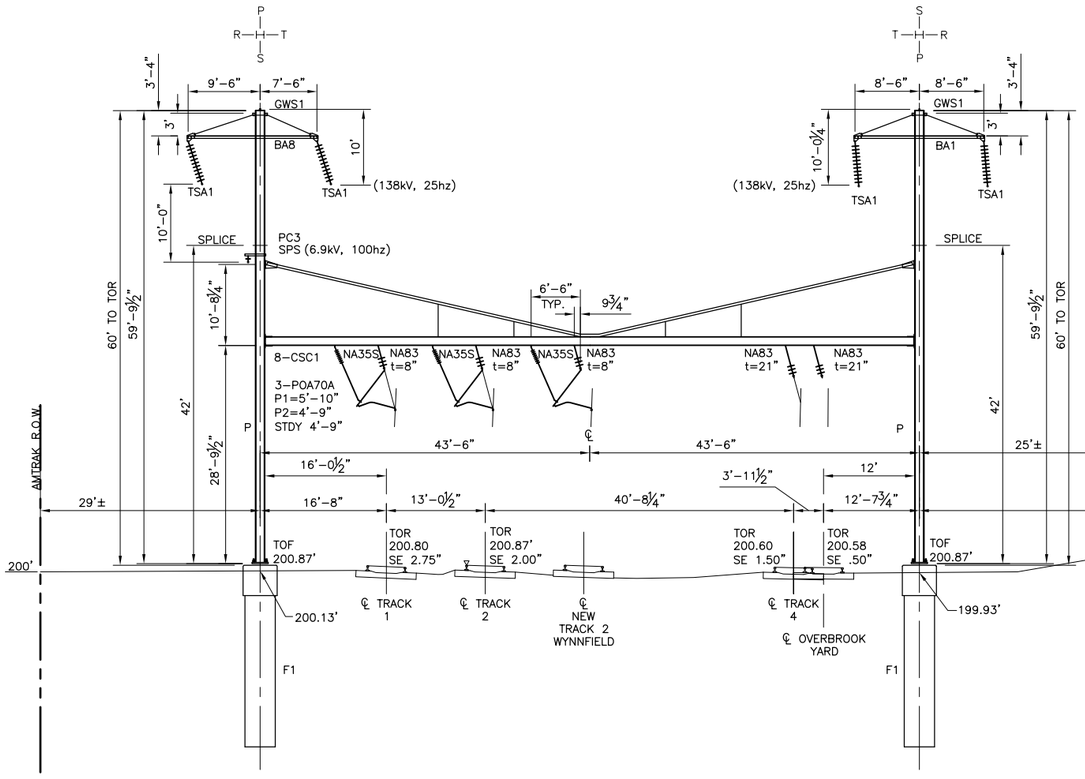
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–123

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1532.DWG
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ET–1532

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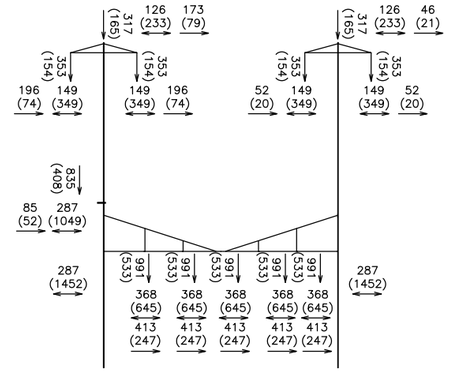
STRUCTURE ERECTION DIAGRAM T–122A

275+57

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
235' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	5
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	3
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	3
PC3	SLIDING CLAMP	S–5215	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA1	TRANSMISSION BRACKET	S–5200	1
BA8	TRANSMISSION BRACKET	S–5206	1
CSC1	SLIDING BRACKET	S–5214	8

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–0" ABOVE TRACK 2.
3. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 2.

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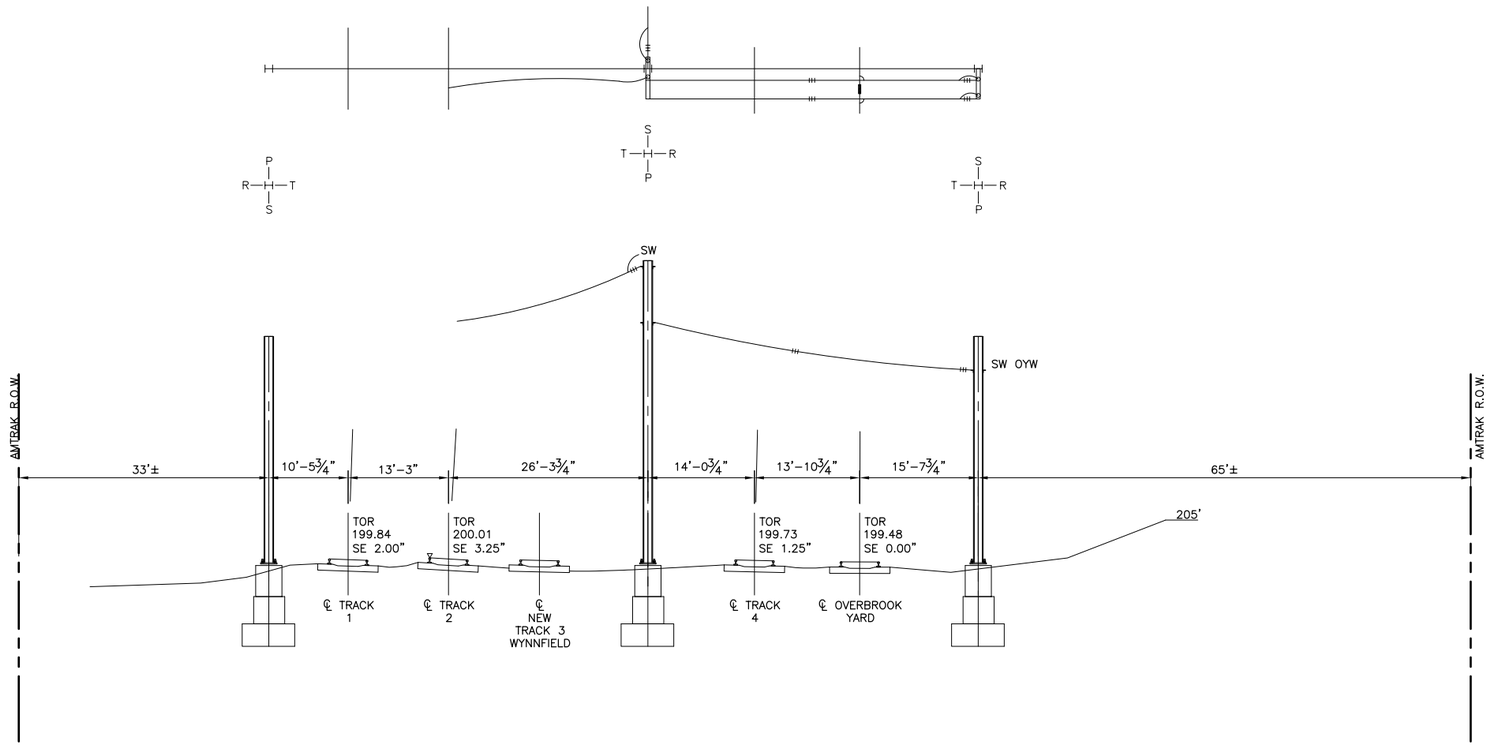
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T–122A

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1533.DWG
Ref. No.:	2011–059
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ET–1533

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STRUCTURE ERECTION DIAGRAM T-121 1/2 (EXISTING)

274+57
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

NOTE:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.

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IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-121 1/2 (EXISTING)

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

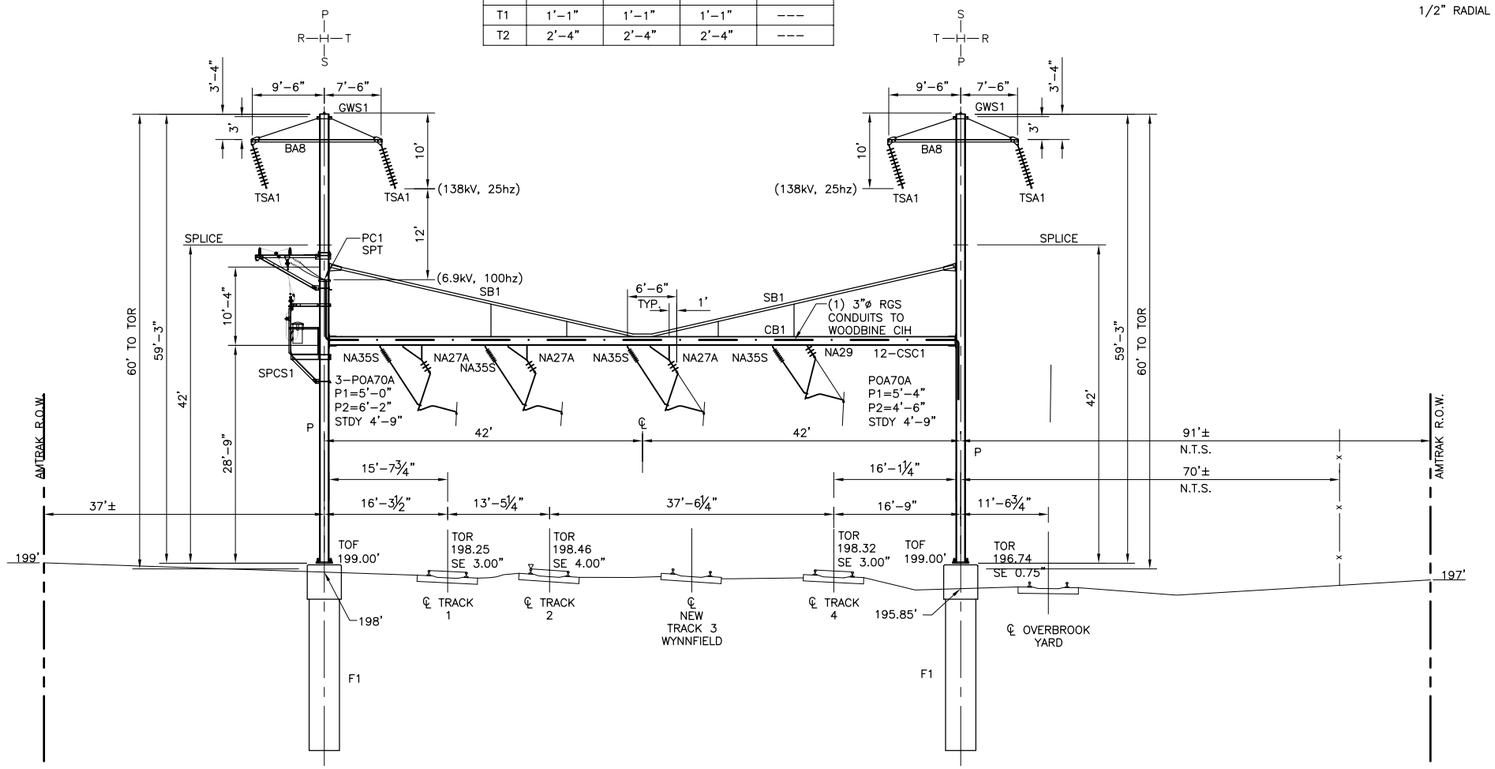
File No.:	2011-059-ET-1534.DWG
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ET-1534

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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	26'–0"	26'–0"	26'–0"	28'–1½"
CW	20'–6"	20'–6"	20'–6"	22'–2½"

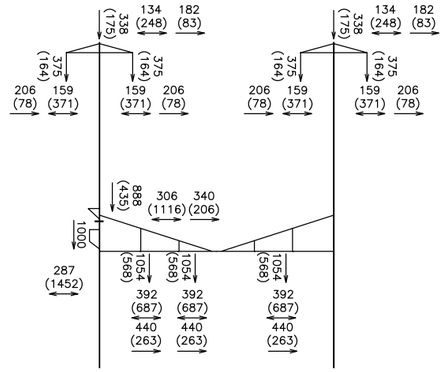
MESSENGER SUPPORT NA27A DIMENSIONS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T1	1'–1"	1'–1"	1'–1"	---
T2	2'–4"	2'–4"	2'–4"	---



STRUCTURE ERECTION DIAGRAM T–121A

272+83
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60'F)
250' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA29	MESSENGER SUPPORT	ET–1904	1
NA27A	MESSENGER SUPPORT	ET–1904	3
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC1	SLIDING CLAMP	S–5214	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET	S–5206	2
CSC1	SLIDING BRACKET	S–5214	11
––	3" RGS CONDUIT	––	100'

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
5. INSTALL STATIC, TRANSMISSION, AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. FINAL WIRE HEIGHTS AND REGISTRATION DIMENSIONS WILL BE ESTABLISHED WHEN WYNNFIELD PROFILES ARE COMPLETE.
3. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–6" ABOVE TRACK 2.
4. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 2.

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–121A

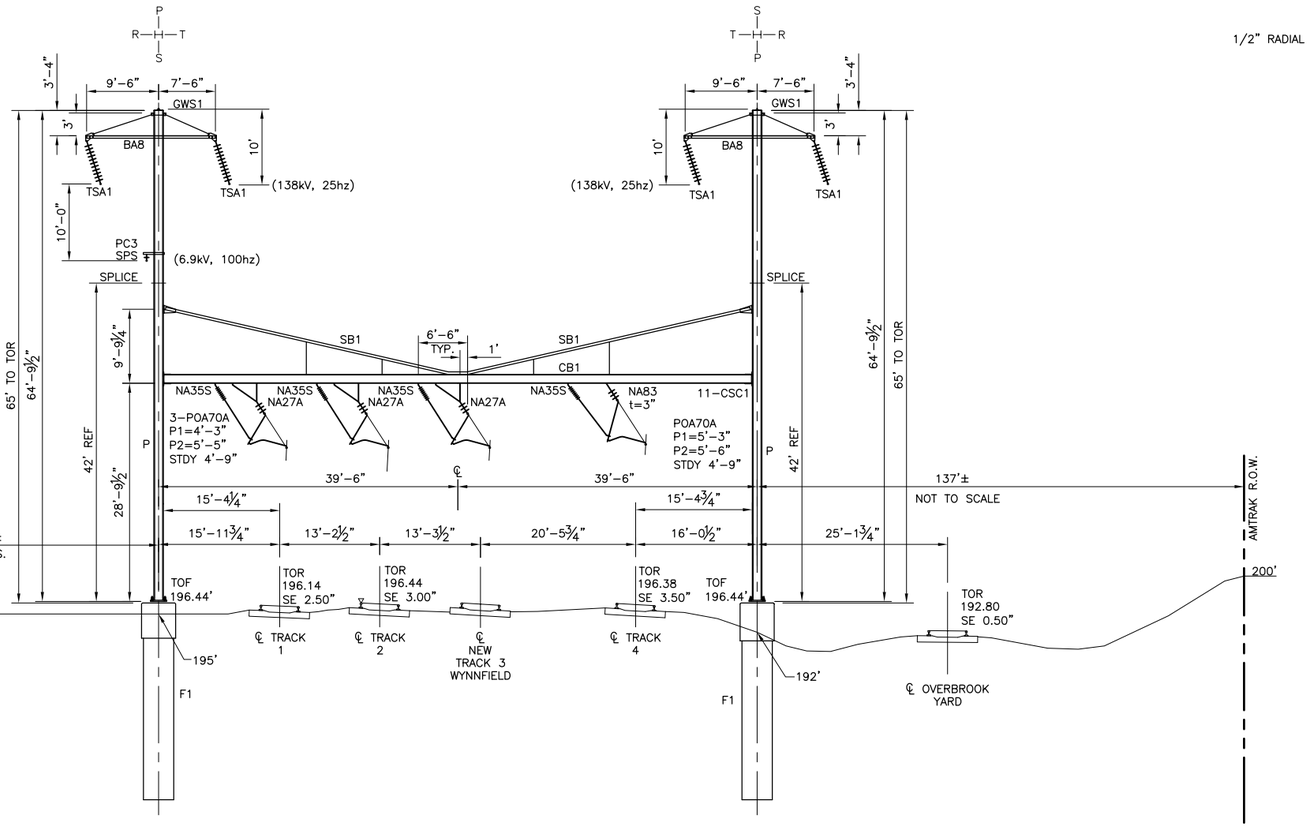
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1535.DWG
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Sheet No:	192 OF 347

ET–1535

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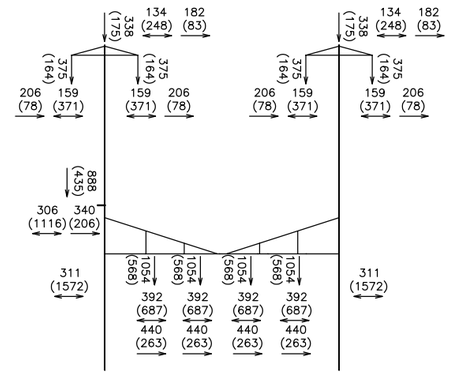
PROPOSED CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW	25'–0"	25'–0"	25'–0"	26'–10"
CW	20'–6"	20'–6"	20'–6"	21'–0"



STRUCTURE ERECTION DIAGRAM T–120A

270+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
250' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA83	MESSENGER SUPPORT	ET–1904	1
NA27A	MESSENGER SUPPORT	ET–1904	3
NA35S	SYNTHETIC PIPE INSULATOR	ET–1904	4
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
POA70A	REGISTRATION ASSEMBLY	ET–1902	4
PC3	SLIDING CLAMP	S–5214	1
P	POLE	S–5103	2
F1	FOUNDATION	S–5102	2
SB1	SAG BRACE	S–5105	2
CB1	CROSS BEAM	S–5104	1
BA8	TRANSMISSION BRACKET	S–5206	2
CSC1	SLIDING BRACKET	S–5212	11

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. FINAL WIRE HEIGHTS AND REGISTRATION DIMENSIONS WILL BE ESTABLISHED WHEN WYNNFIELD PROFILES ARE COMPLETE.
3. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'–0" ABOVE TRACK 2.
4. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 2.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL ERECTION DIAGRAM T–120A

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

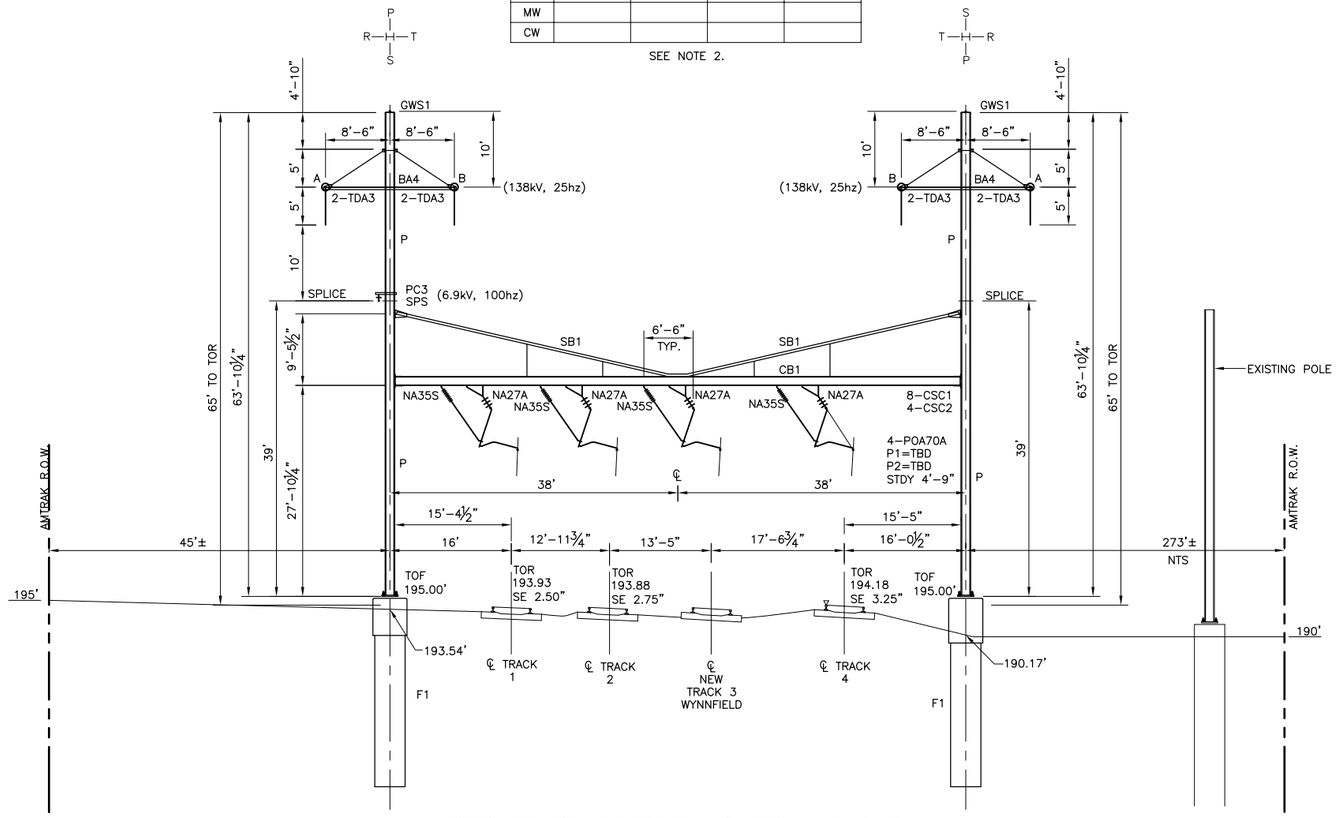
File No.:	2011–059–ET–1536.DWG
Ref. No.:	2011–059
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CATENARY WIRE HEIGHTS				
	TRACK 1	TRACK 2	TRACK 3	TRACK 4
MW				
CW				

SEE NOTE 2.



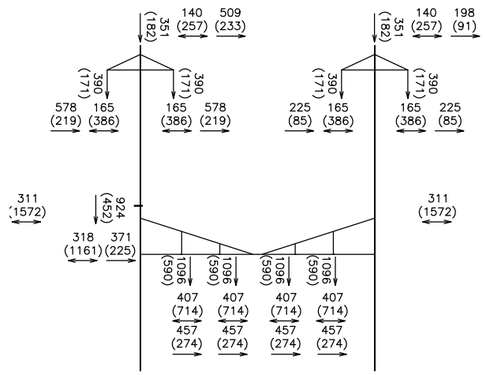
STRUCTURE ERECTION DIAGRAM T-118A

267+80

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA27A	MESSENGER SUPPORT	ET-1904	4
NA35S	SYNTHETIC PIPE INSULATOR	ET-1904	4
GWS1	GROUND WIRE ASSEMBLY	ET-1909	2
TDA3	TRANSMISSION DEADEND	ET-1800	8
SPS	SIGNAL POWER SUPPORT	ET-1913	1
POA70A	REGISTRATION ASSEMBLY	ET-1902	4
PC3	SLIDING CLAMP	S-5214	1
P	POLE	S-5103	2
F1	FOUNDATION	S-5102	2
SB1	SAG BRACE	S-5105	2
CB1	CROSS BEAM	S-5104	1
BA4	TRANSMISSION BRACKET	S-5203	2
CSC1	SLIDING BRACKET	S-5212	8
CSC2	SLIDING BRACKET - CLEVIS	S-5212	4

WORK STATEMENT:

1. INSTALL FOUNDATIONS.
2. INSTALL POLES, CROSS BEAM AND SAG BRACES.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL SIGNAL POWER SUPPORT BRACKET.
5. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
6. TRANSFER FOG AND EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
7. INSTALL SLIDING BEAM CLAMPS AND MESSENGER SUPPORTS.
8. TRANSFER CATENARY WIRES TO NEW STRUCTURE.
9. ADJUST HANGERS IN CATENARY SPANS AND REPROFILE CATENARY.
10. DEMO OLD CAT POLES AND FOUNDATIONS.

NOTES:

1. WYNNFIELD INTERLOCKING IS DESIGNED BY OTHERS.
2. FINAL WIRE HEIGHTS AND REGISTRATION DIMENSIONS WILL BE ESTABLISHED WHEN WYNNFIELD PROFILES ARE COMPLETE.
3. BOTTOM OF STEEL (CROSS BEAM) IS SHOWN AT 29'-0" ABOVE TRACK 4.
4. TOP OF FOUNDATIONS ARE SHOWN AT TOP OF RAIL, TRACK 4.

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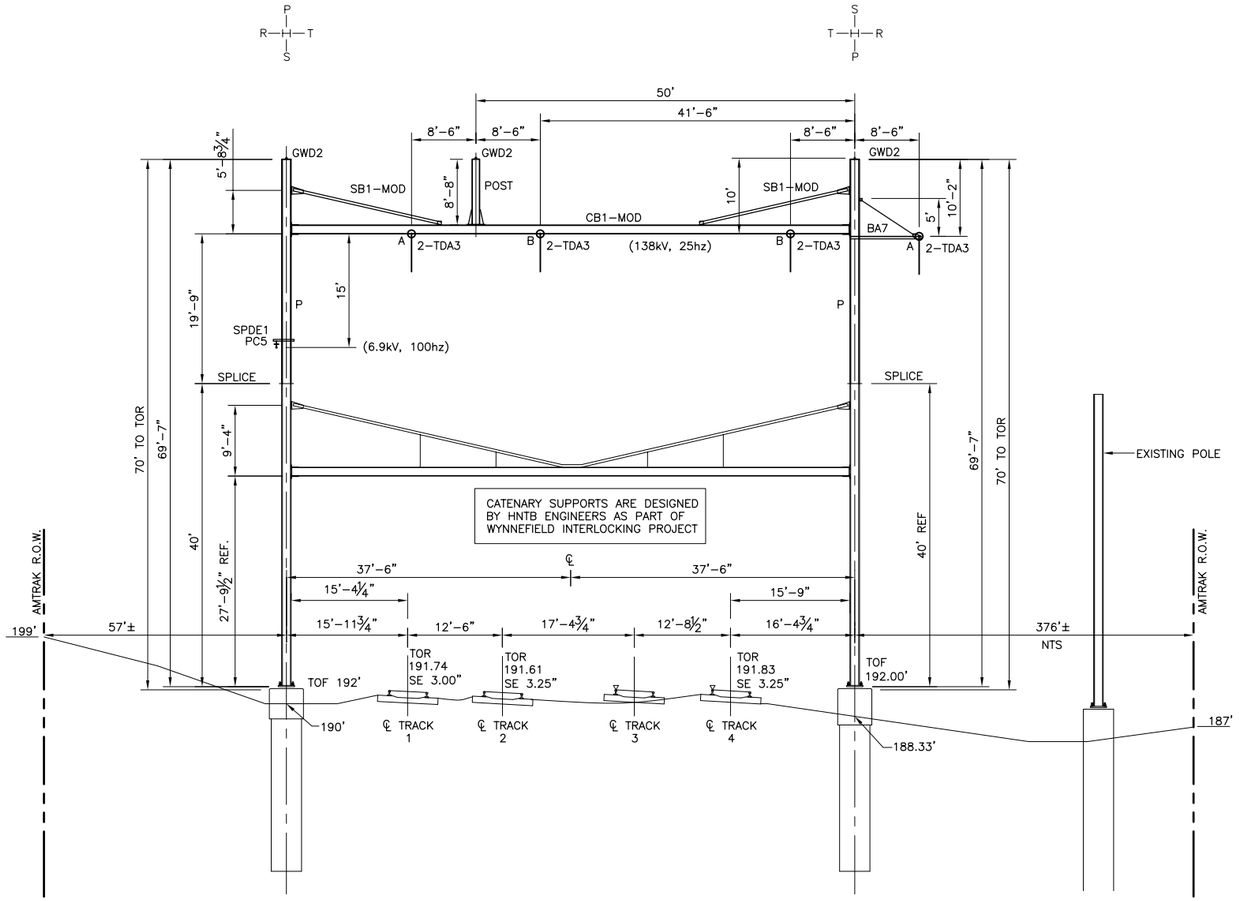
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-118A

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1537.DWG
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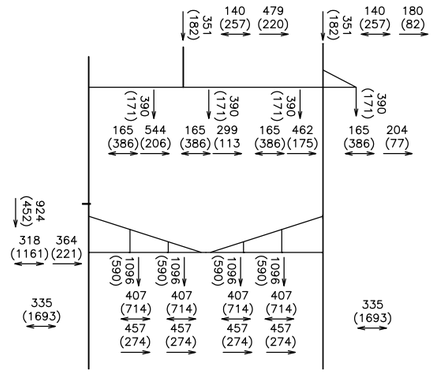
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STRUCTURE ERECTION DIAGRAM T-117A

265+26
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET-1909	3
TDA3	TRANSMISSION DEADEND	ET-1800	8
SPDE1	SIGNAL POWER DEADEND	ET-1913	1
PC5	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION	S-5103	2
SB1-MOD	SAG BRACE - SHORT	S-5105	2
CB1-MOD	CROSS BEAM	S-5104	1
POST	GROUND WIRE POST	S-5106	1
BA7	TRANSMISSION BRACKET	S-5205	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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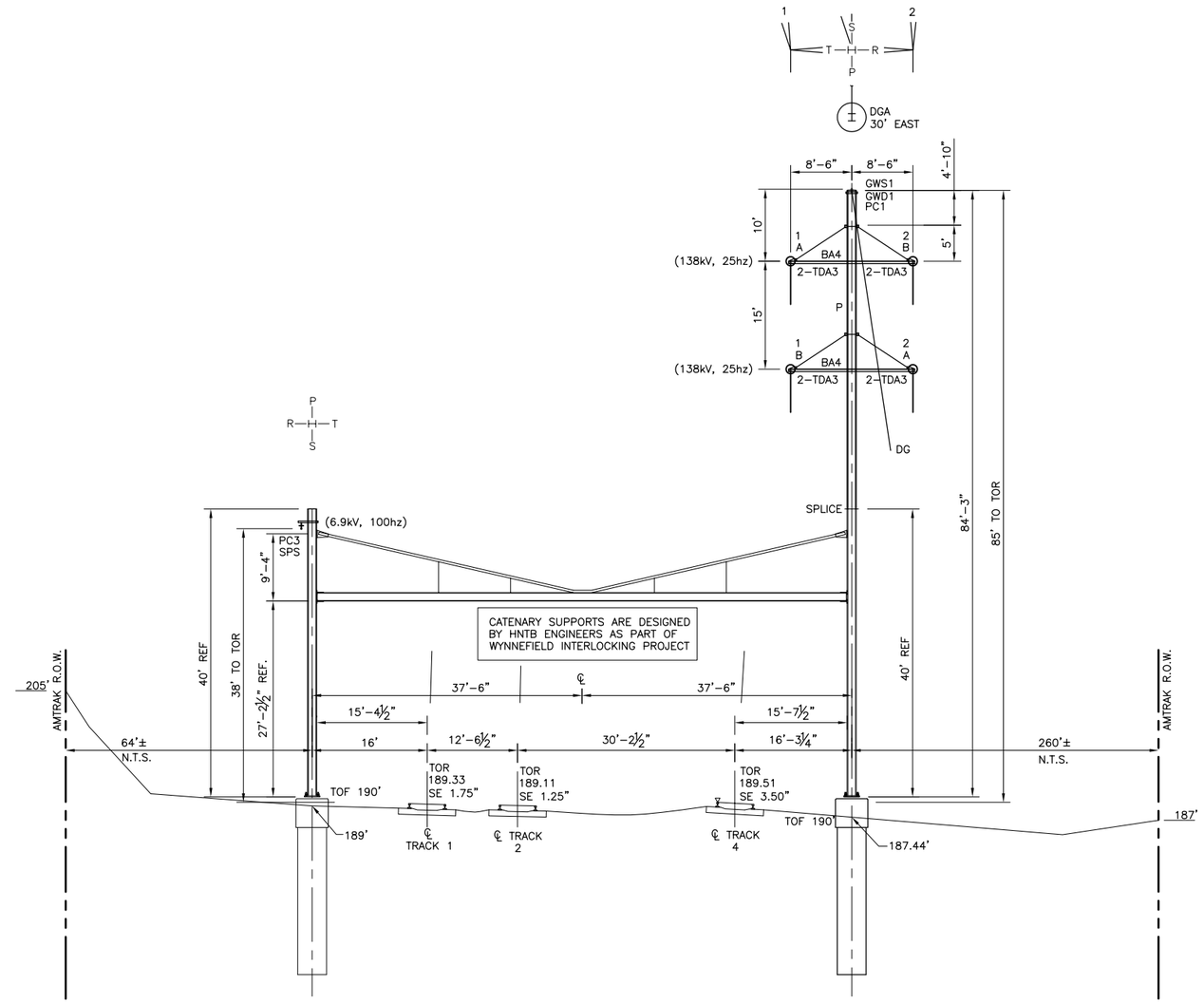
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-117A

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1538.DWG
Ref. No.:	2011-059
Sheet No:	195 OF 347

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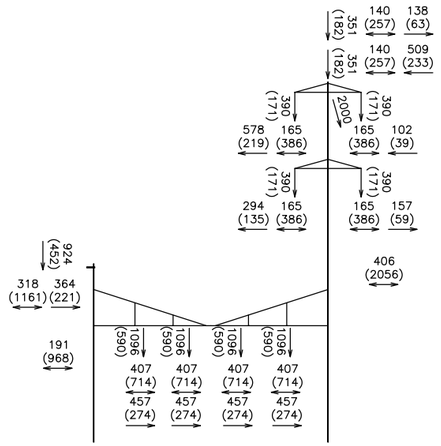
STRUCTURE ERECTION DIAGRAM T-116A

262+62

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
GWD1	GROUND WIRE DEAD END	ET-1909	1
TDA3	TRANSMISSION DEADEND	ET-1800	8
SPS	SIGNAL POWER SUPPORT	ET-1913	1
DG	DOWN GUY	ET-1908	1
PC1	SLIDING CLAMP	S-5214	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION	S-5103	1
BA4	TRANSMISSION BRACKET	S-5203	2
DGA	DOWN GUY FOUNDATION	S-5101	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-116A

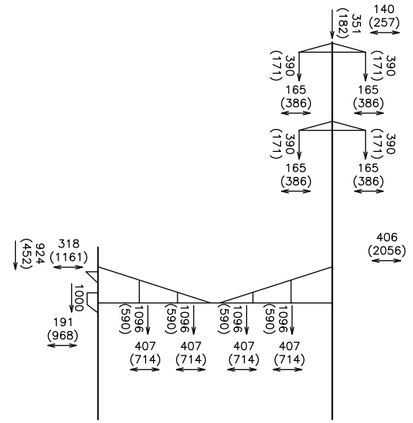
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File No.:	2011-059-ET-1539.DWG
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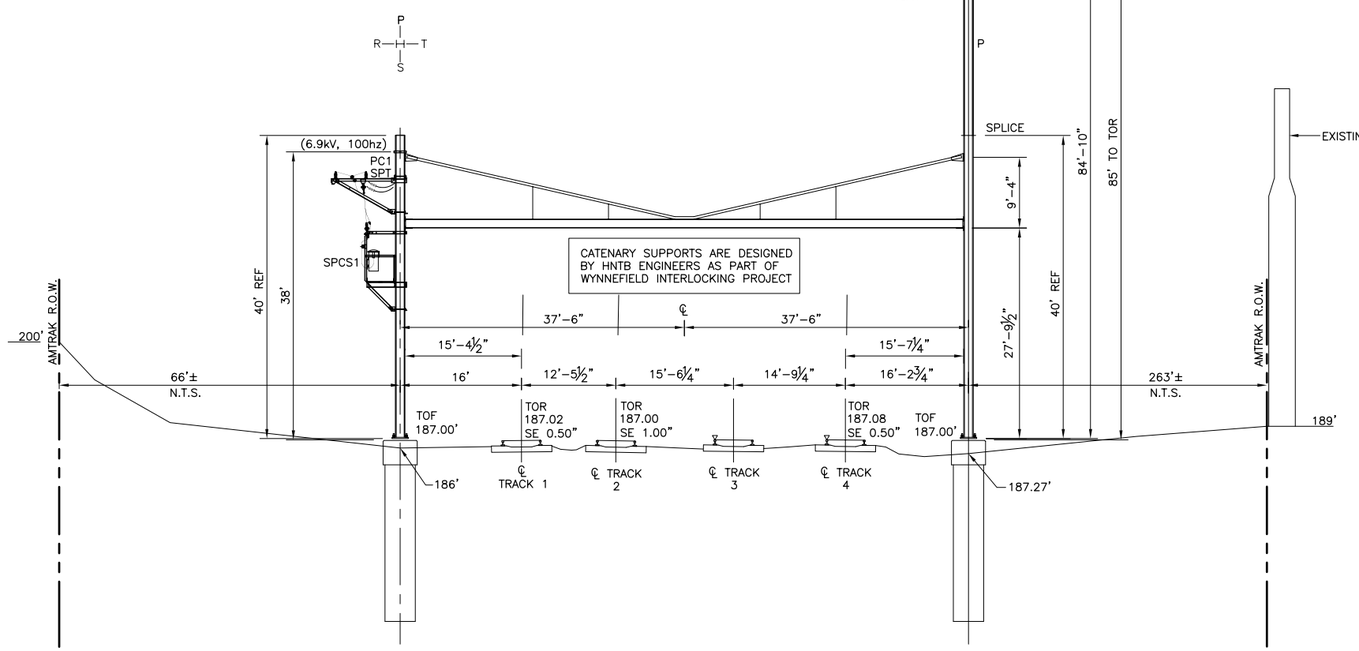
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
P	POLE EXTENSION	S–5103	1
BA1	TRANSMISSION BRACKET	S–5200	2



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T–115A

260+02
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORMS.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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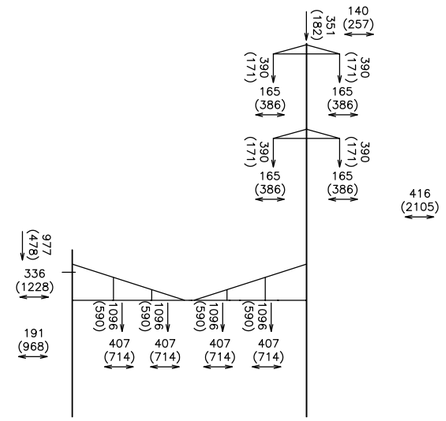
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–115A

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1540.DWG
Ref. No.:	2011–059
Sheet No:	197 OF 347

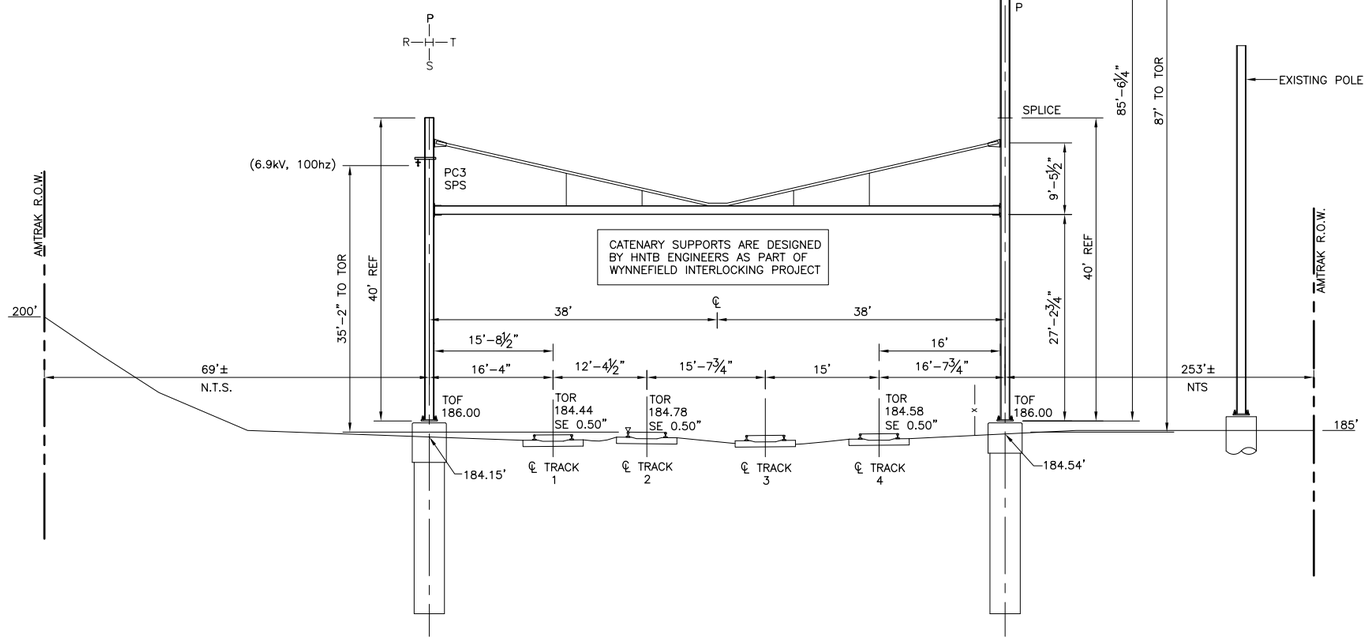
ET–1540

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION	S-5103	1
BA1	TRANSMISSION BRACKET	S-5200	2



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-113A

257+42
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-113A

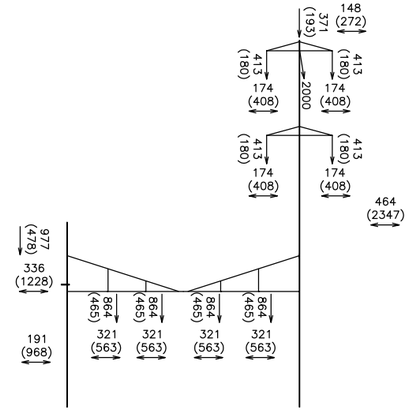
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File No.:	2011-059-ET-1541.DWG
Ref. No.:	2011-059
Sheet No:	198 OF 347

ET-1541

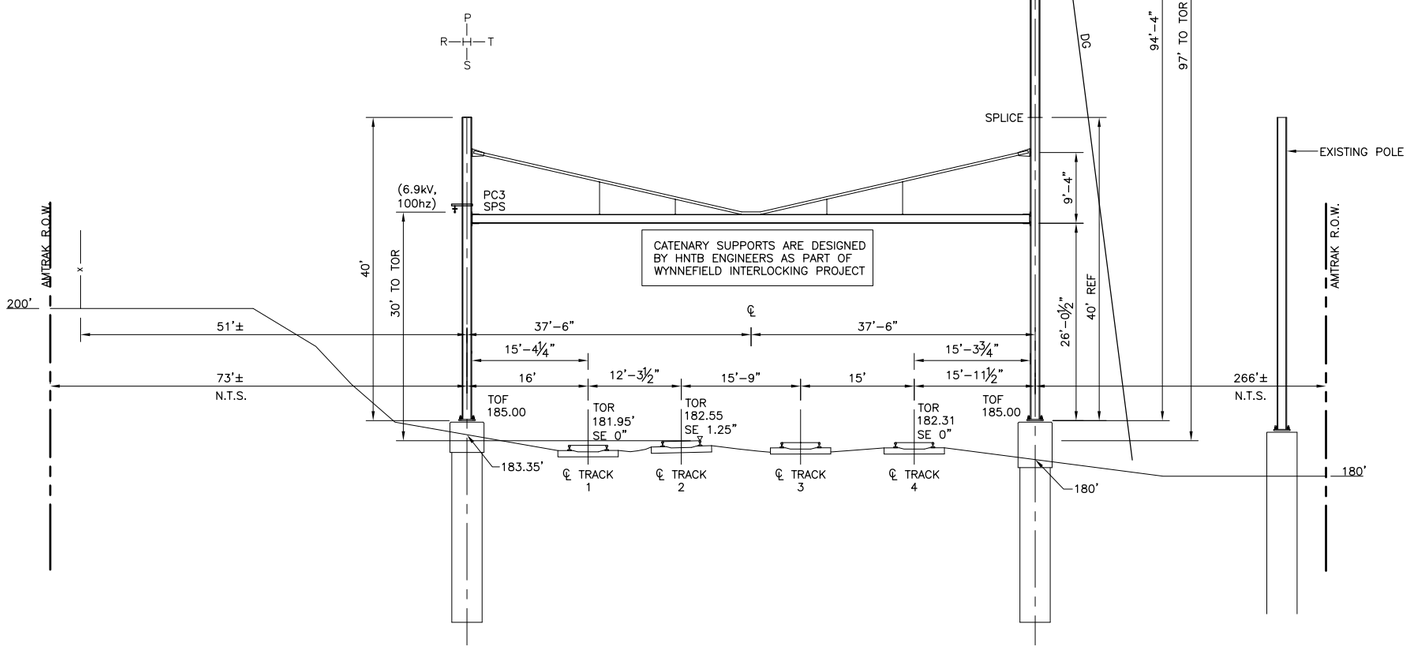
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
DG	DOWN GUY	ET-1908	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION	S-5103	1
BA1	TRANSMISSION BRACKET	S-5200	2
DGA	DOWN GUY FOUNDATION	S-5101	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' TRANSMISSION LOAD SPAN
205' CATENARY LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-112A

254+77
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-112A

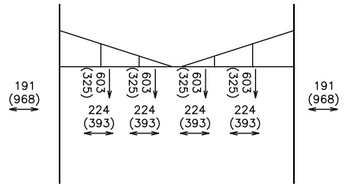
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1542.DWG
Ref. No.:	2011-059
Sheet No:	199 OF 347

ET-1542

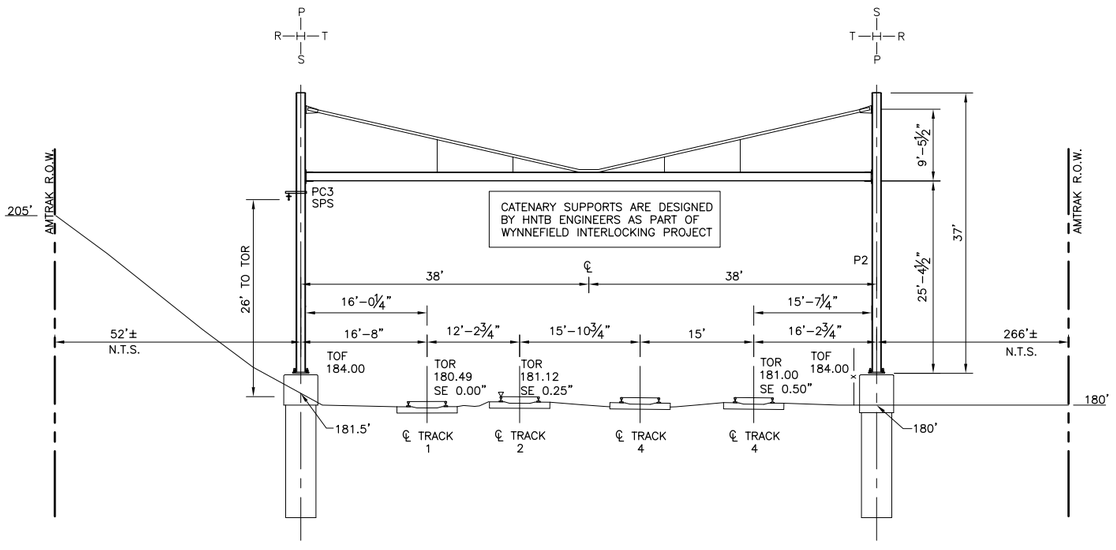
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
143' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T–111

253+34
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

NOTES:

1. INSTALL SIGNAL POWER SUPPORT BRACKET.
2. INSTALL INSULATED SIGNAL POWER WIRES.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–111

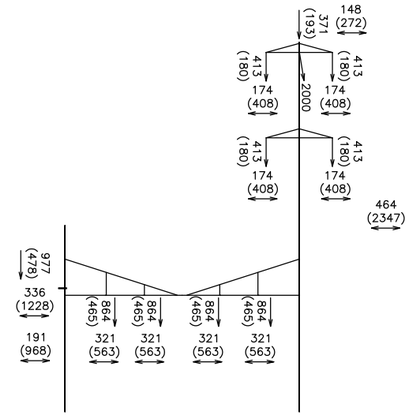
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File No.:	2011–059–ET–1543.DWG
Ref. No.:	2011–059
Sheet No:	200 OF 347

ET–1543

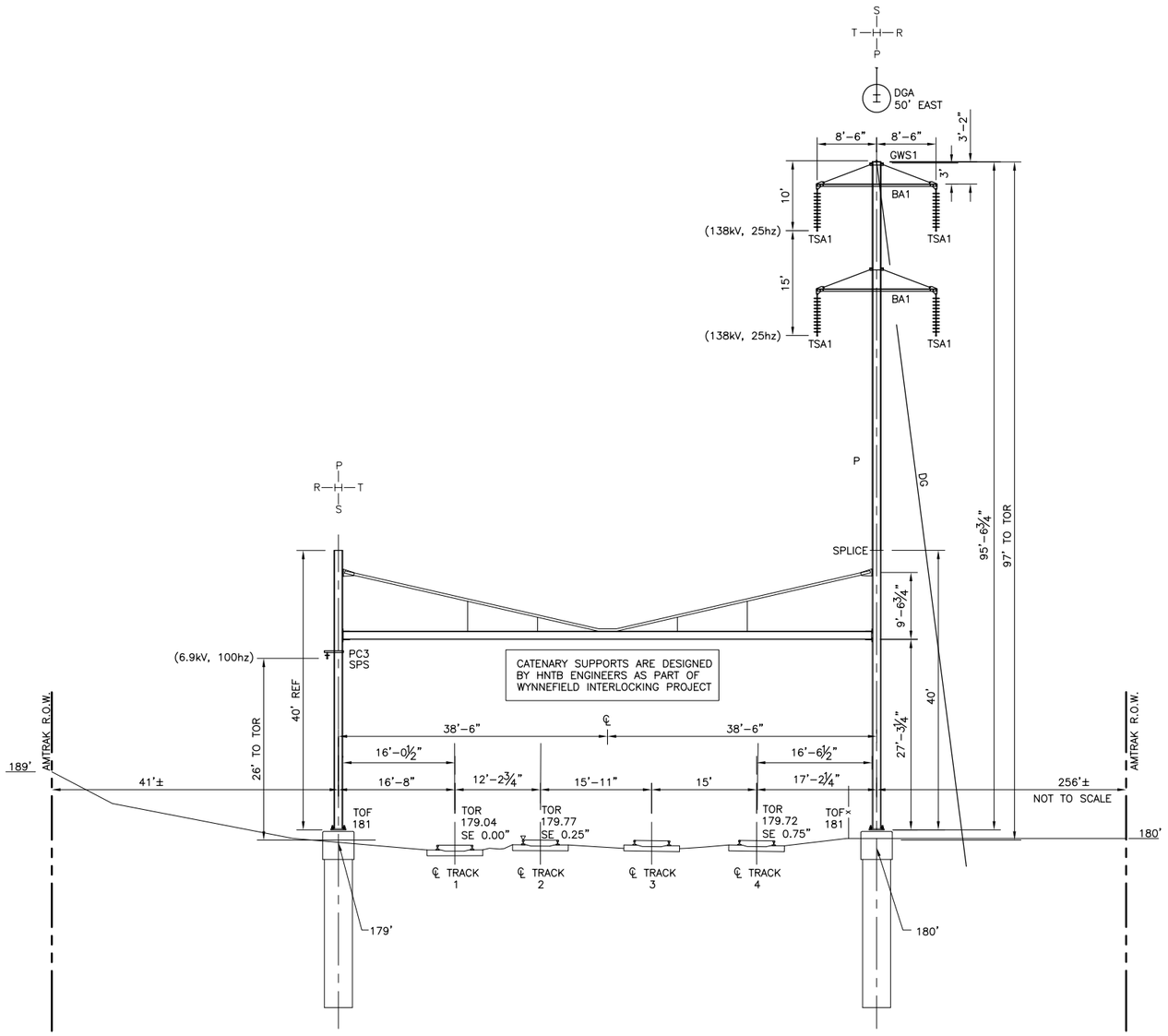
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
SPS	SIGNAL POWER SUPPORT	ET-1913	1
DG	DOWN GUY	ET-1908	1
PC3	SLIDING CLAMP	S-5215	1
P	POLE EXTENSION	S-5103	1
BA1	TRANSMISSION BRACKET	S-5200	2
DGA	DOWN GUY FOUNDATION	S-5101	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' TRANSMISSION LOAD SPAN
205' CATENARY LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM T-110

251+91
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T-110

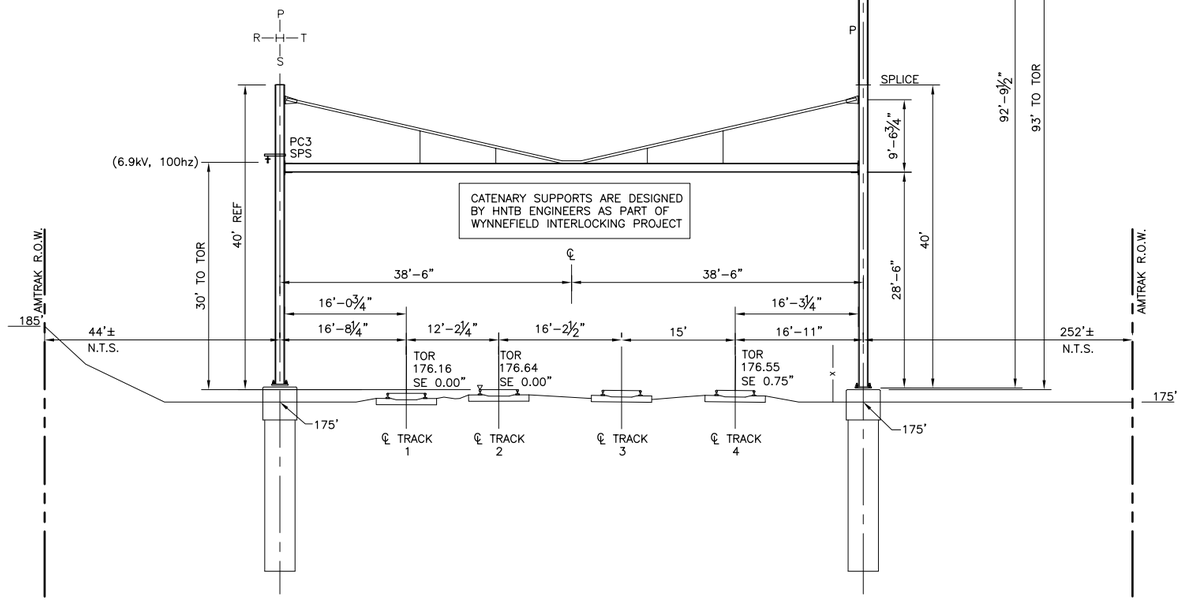
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File No.:	2011-059-ET-1544.DWG
Ref. No.:	2011-059
Sheet No:	201 OF 347

ET-1544

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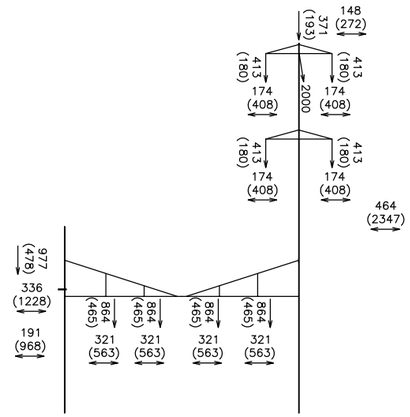
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
PC3	SLIDING CLAMP	S–5215	1
P	POLE EXTENSION	S–5103	1
BA1	TRANSMISSION BRACKET	S–5200	2



STRUCTURE ERECTION DIAGRAM T–109

248+88
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' TRANSMISSION LOAD SPAN
205' CATENARY LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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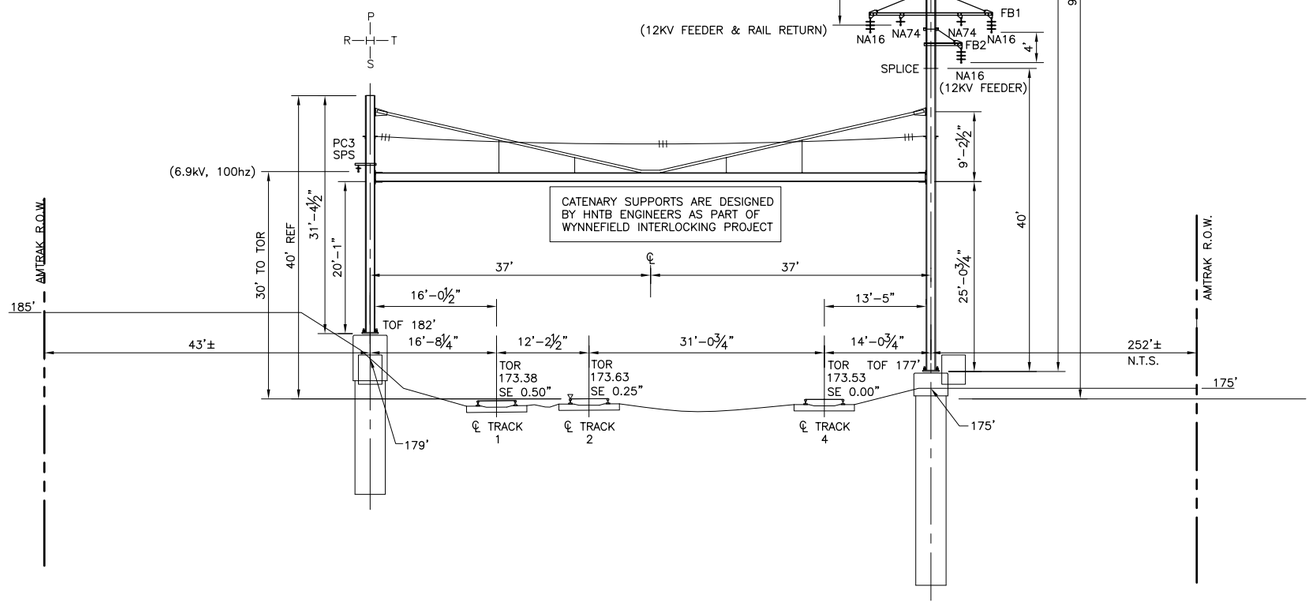
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–109

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File No.:	2011-059-ET-1545.DWG
Ref. No.:	2011–059
Sheet No:	202 OF 347

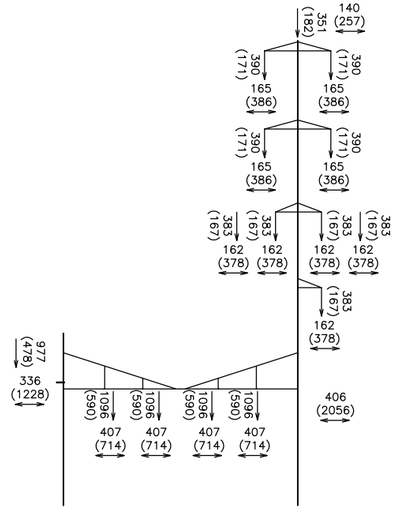
ET–1545

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STRUCTURE ERECTION DIAGRAM T-108

245+89
LOOKING TOWARDS HARRISBURG
0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET-1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET-1800	4
PC3	SLIDING CLAMP	S-5215	1
SPS	SIGNAL POWER SUPPORT	ET-1913	1
NA16	TRANSMISSION WIRE SUPPORT	ET-1906	3
NA74	TRANSMISSION WIRE SUPPORT	ET-1906	2
P	POLE EXTENSION	S-5103	1
BA1	TRANSMISSION BRACKET	S-5200	2
FB1	FEEDER BRACKET - FOUR	S-5226	1
FB2	FEEDER BRACKET - SINGLE	S-5227	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. TRANSFER EXISTING 12KV FEEDERS AND RAIL RETURN TO NEW BRACKETS.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

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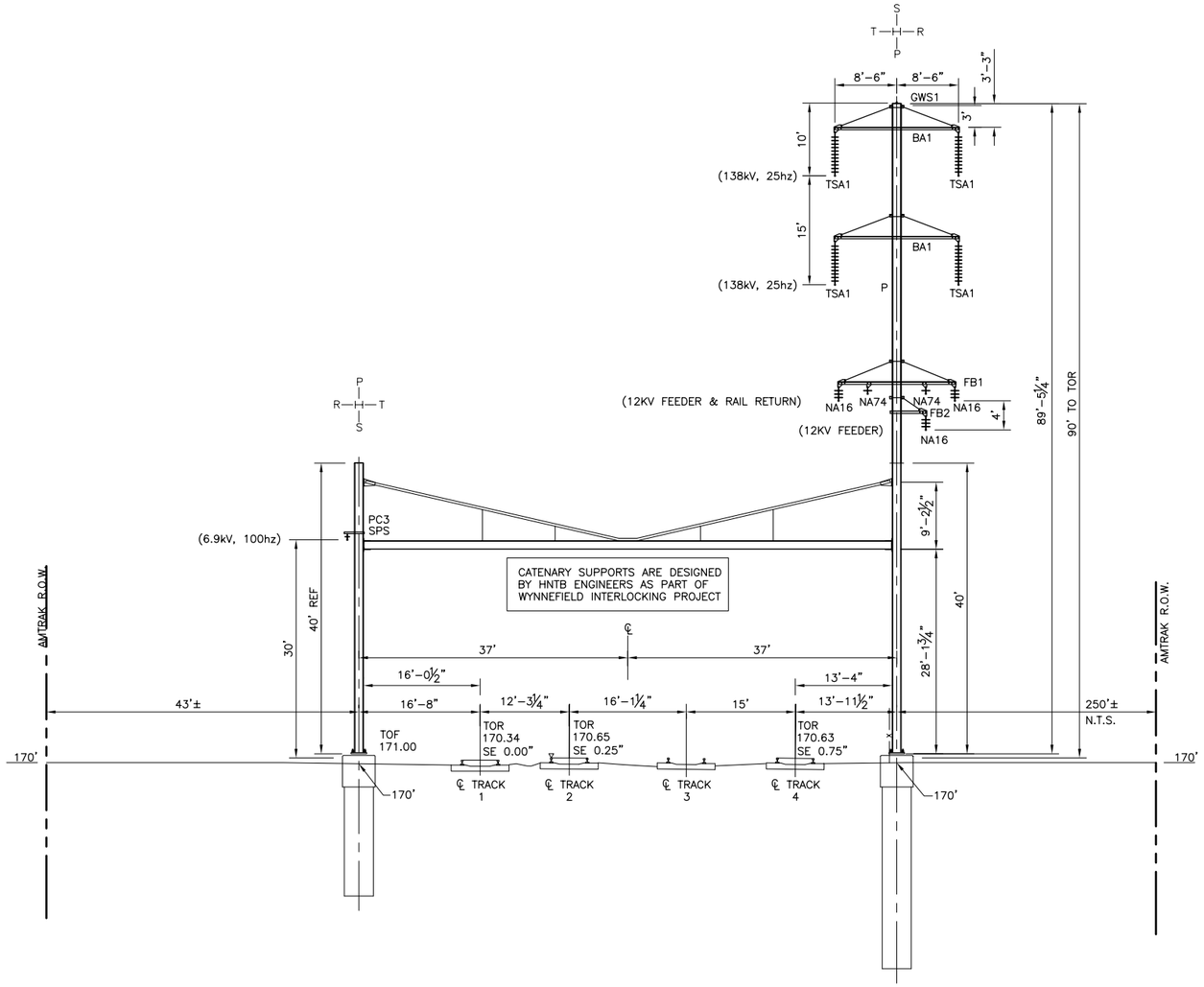
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM T-108

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

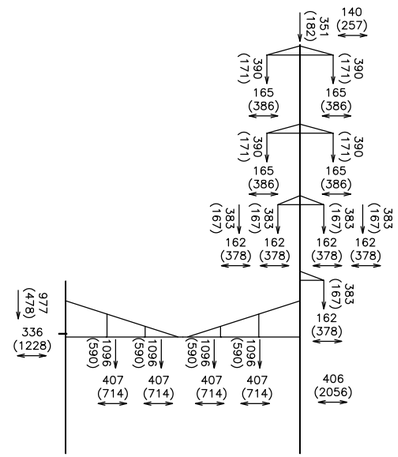
File No.:	2011-059-ET-1546.DWG
Ref. No.:	2011-059
Sheet No:	203 OF 347

ET-1546



STRUCTURE ERECTION DIAGRAM T–107

242+89
LOOKING TOWARDS HARRISBURG
0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
NA16	TRANSMISSION WIRE SUPPORT	ET–1906	3
NA74	TRANSMISSION WIRE SUPPORT	ET–1906	2
P	POLE EXTENSION	S–5103	1
BA1	TRANSMISSION BRACKET	S–5200	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1
PC3	SLIDING CLAMP	S–5215	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. DEMO OLD CAT POLES AND FOUNDATIONS.

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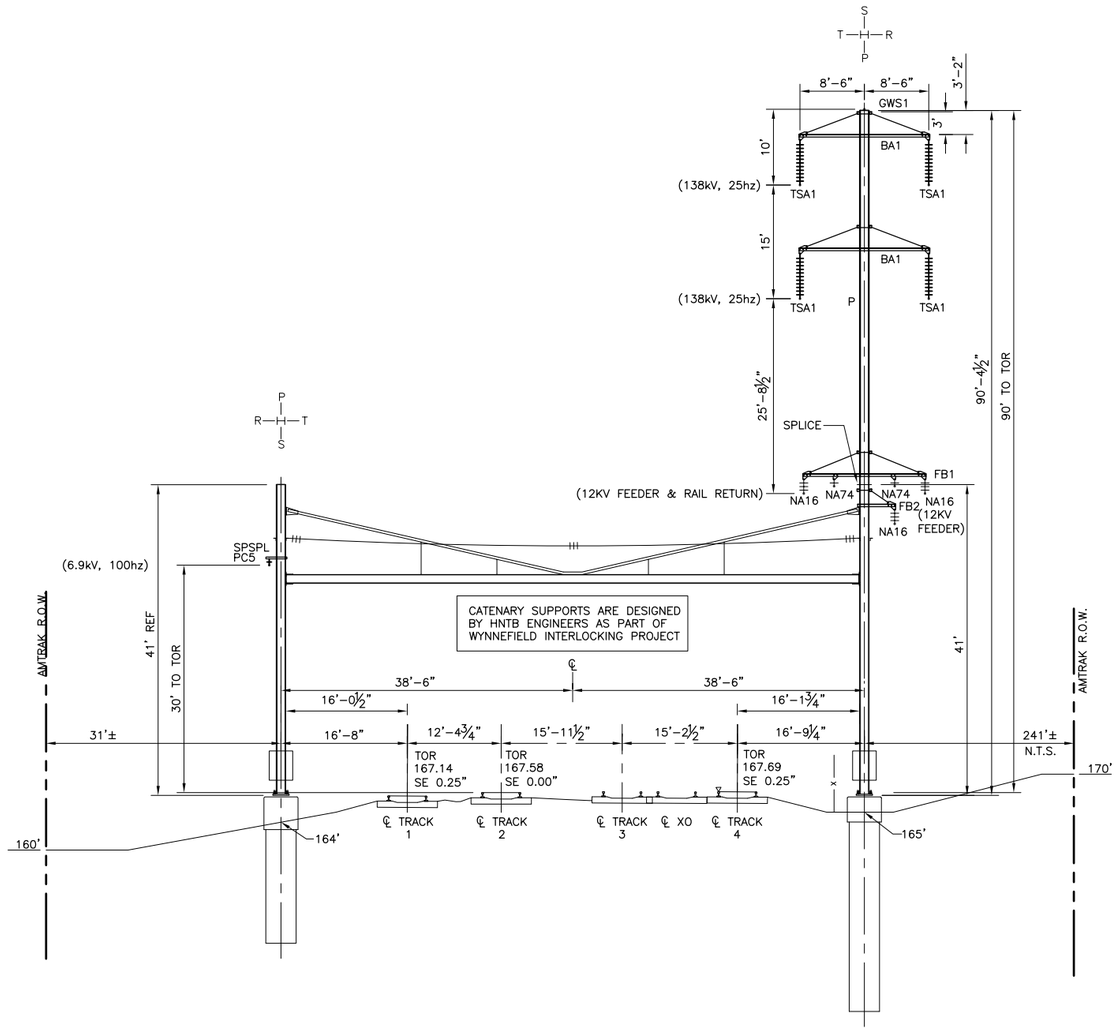
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–107

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1547.DWG
Ref. No.:	2011–059
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ET–1547



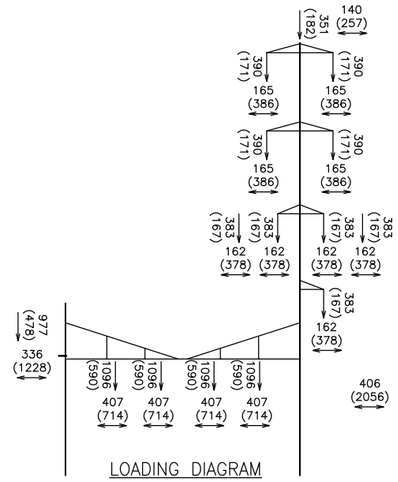
STRUCTURE ERECTION DIAGRAM T–106

239+89

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
260' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPSPL	SIGNAL POWER SPLICE	ET–1913	1
NA16	TRANSMISSION WIRE SUPPORT	ET–1906	3
NA74	TRANSMISSION WIRE SUPPORT	ET–1906	2
P	POLE EXTENSION	S–5103	1
BA1	TRANSMISSION BRACKET	S–5200	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1
PC5	SLIDING CLAMP	S–5215	1

WORK STATEMENT:

1. INSTALL POLE EXTENSIONS ONTO EXISTING POLE BASES INSTALLED BY OTHERS.
2. INSTALL TRANSMISSION BRACKETS.
3. INSTALL SIGNAL POWER SUPPORT BRACKET.
4. INSTALL STATIC, TRANSMISSION AND INSULATED SIGNAL POWER WIRES.
5. TRANSFER EXISTING INSULATED SIGNAL POWER WIRES TO NEW STRUCTURE.
6. TRANSFER EXISTING 12KV FEEDERS AND RAIL RETURN TO NEW BRACKETS.
7. DEMO OLD CAT POLES AND FOUNDATIONS.

100% DESIGN SUBMISSION

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
T–106

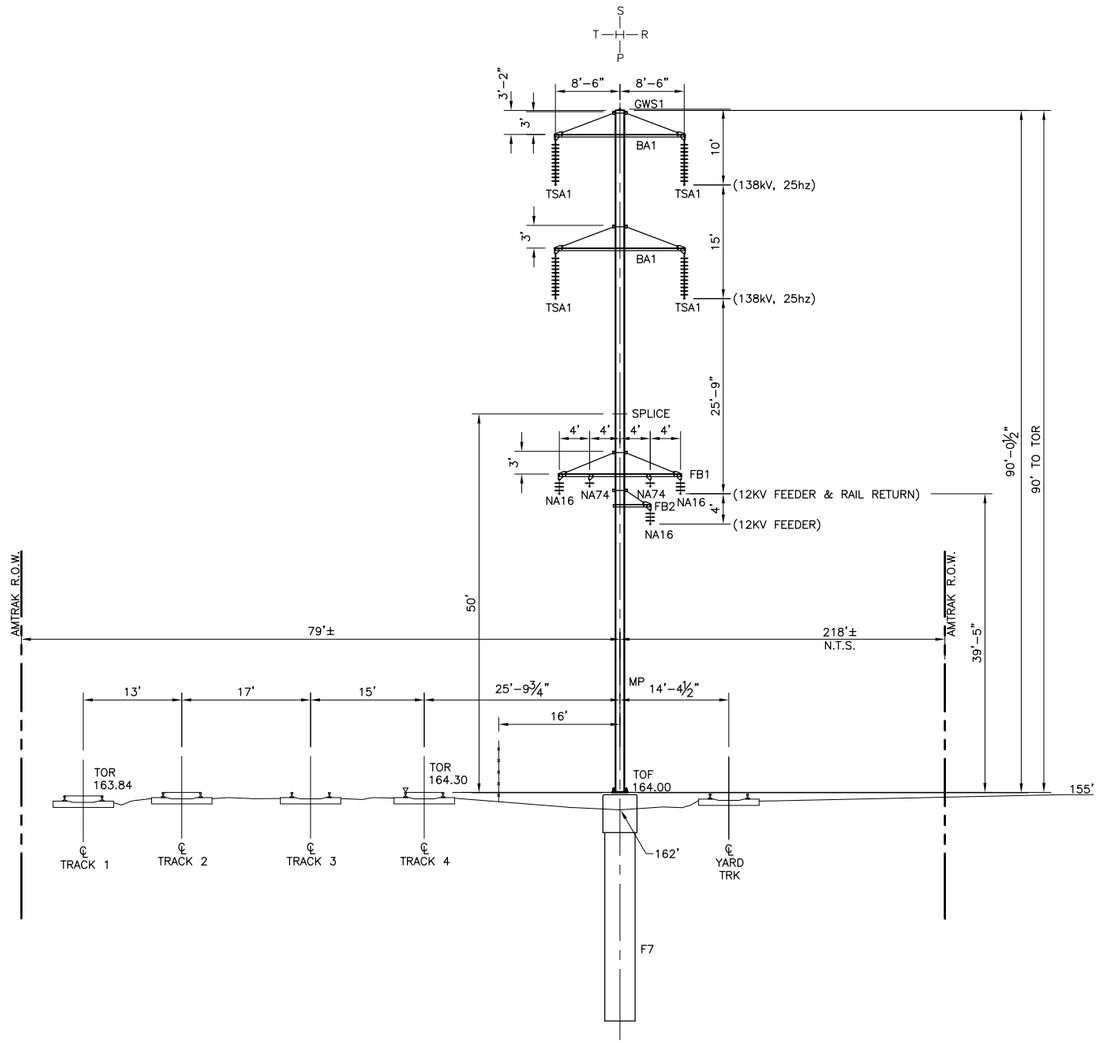
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File No.:	2011–059–ET–1548.DWG
Ref. No.:	2011–059
Sheet No:	205 OF 347

ET–1548

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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
NA16	FEEDER SUPPORT	ET–1906	3
NA74	RAIL RETURN SUPPORT	ET–1906	2
MP	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA1	TRANSMISSION BRACKET	S–5200	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1



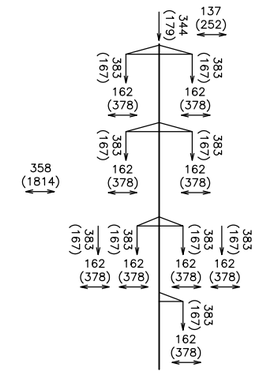
STRUCTURE ERECTION DIAGRAM SP–23A

236+33

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL FEEDER WIRE SUPPORT BRACKET.
5. INSTALL STATIC AND TRANSMISSION WIRES.
6. SUPPORT EXISTING FEEDER WIRES.

100% DESIGN SUBMISSION

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–23A

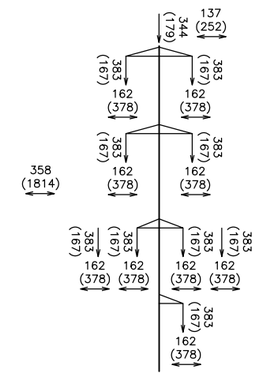
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011–059–ET–1550.DWG
Ref. No.:	2011–059
Sheet No:	206 OF 347

ET–1550

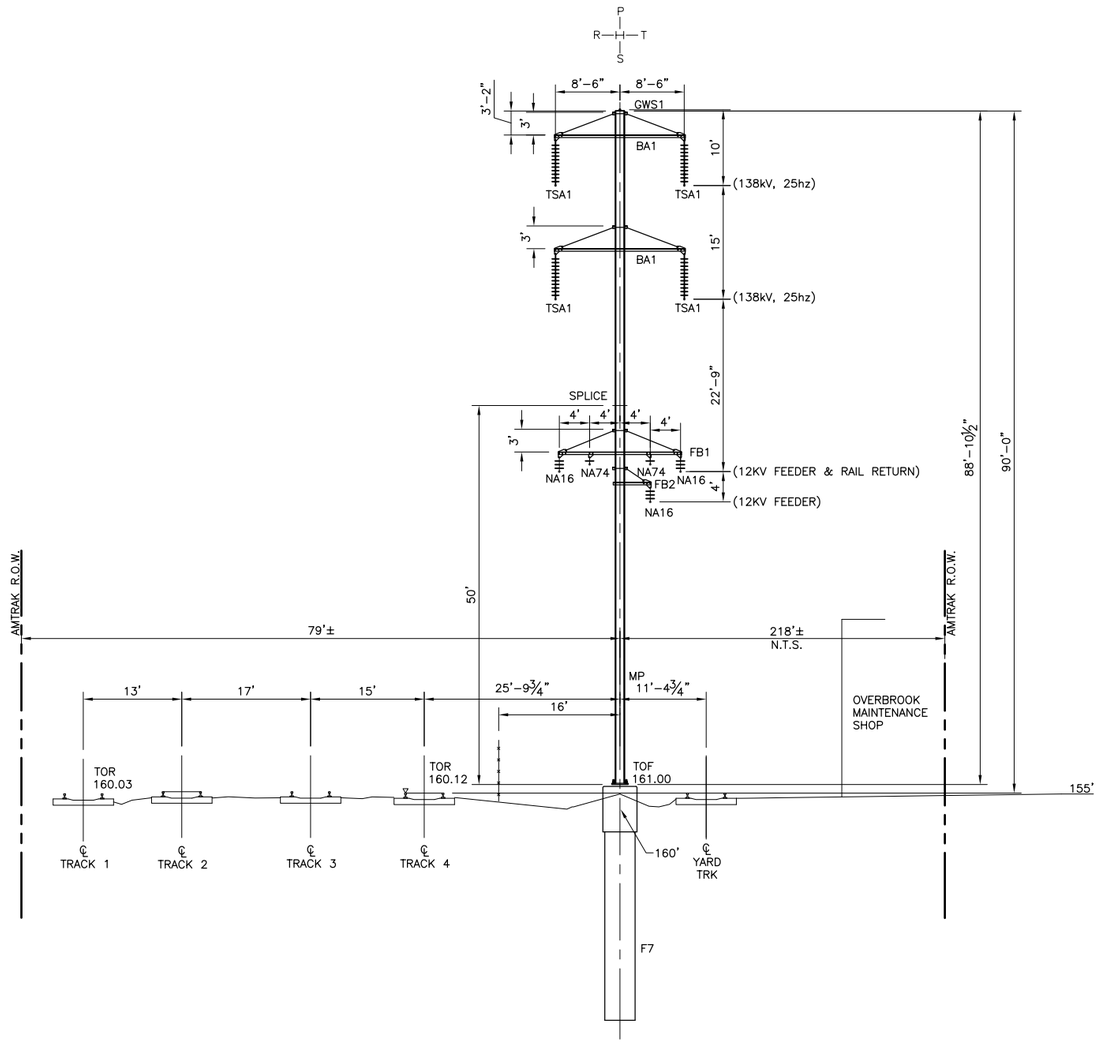
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
NA16	FEEDER SUPPORT	ET–1906	3
NA74	RAIL RETURN SUPPORT	ET–1906	2
MP	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA1	TRANSMISSION BRACKET	S–5200	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM SP–22A

232+73
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL FEEDER WIRE SUPPORT BRACKET.
5. INSTALL STATIC AND TRANSMISSION WIRES.
6. SUPPORT EXISTING FEEDER WIRES.

100% DESIGN SUBMISSION

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–22A

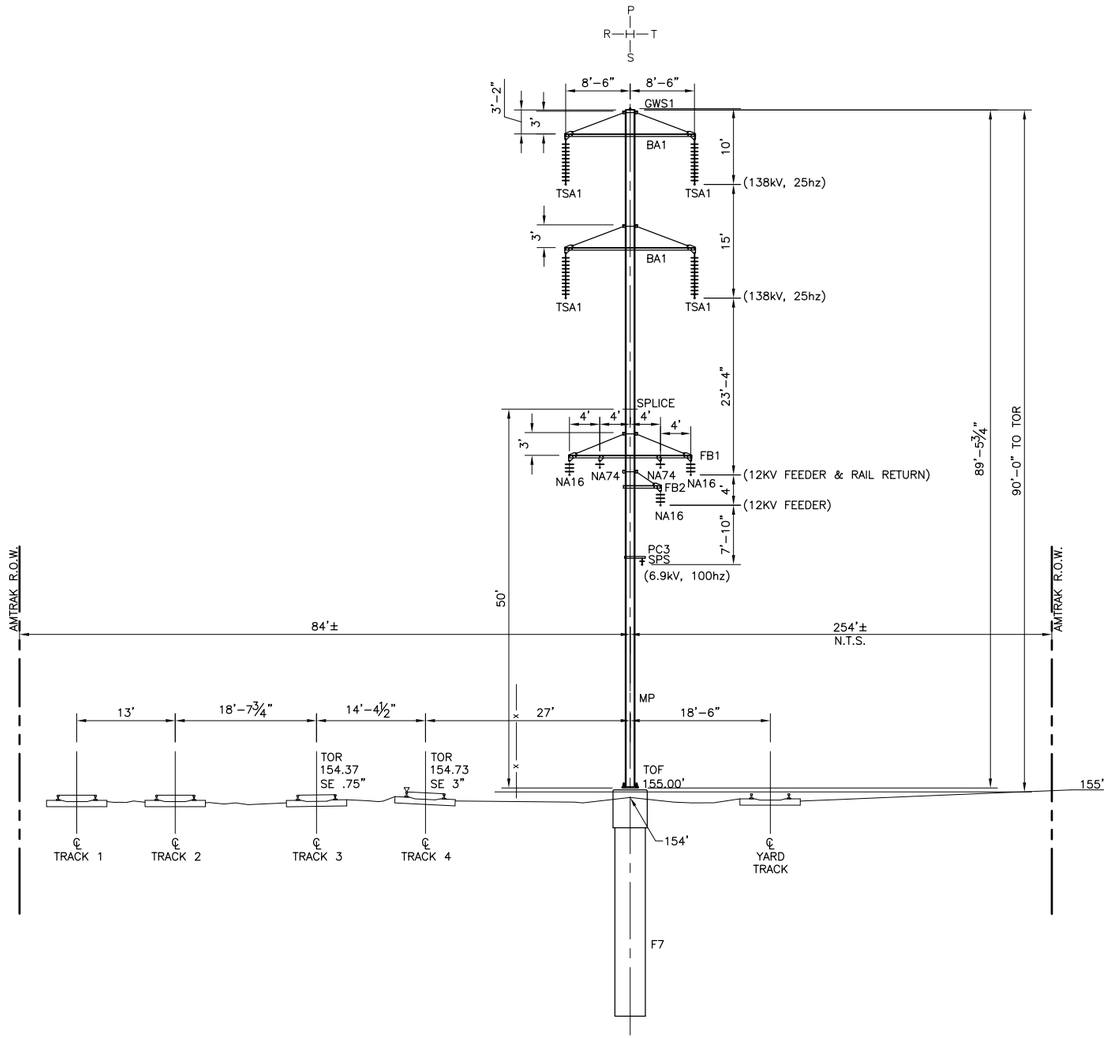
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File No.:	2011–059–ET–1551.DWG
Ref. No.:	2011–059
Sheet No:	207 OF 347

ET–1551

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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
NA16	FEEDER SUPPORT	ET–1906	3
NA74	RAIL RETURN SUPPORT	ET–1906	2
MP	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA1	TRANSMISSION BRACKET	S–5200	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1



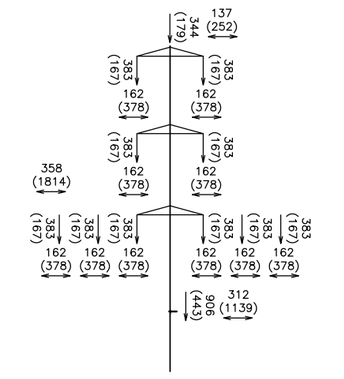
STRUCTURE ERECTION DIAGRAM SP–21A

227+50

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
255' LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL FEEDER WIRE SUPPORT BRACKET.
5. INSTALL STATIC AND TRANSMISSION WIRES.
6. SUPPORT EXISTING FEEDER WIRES.

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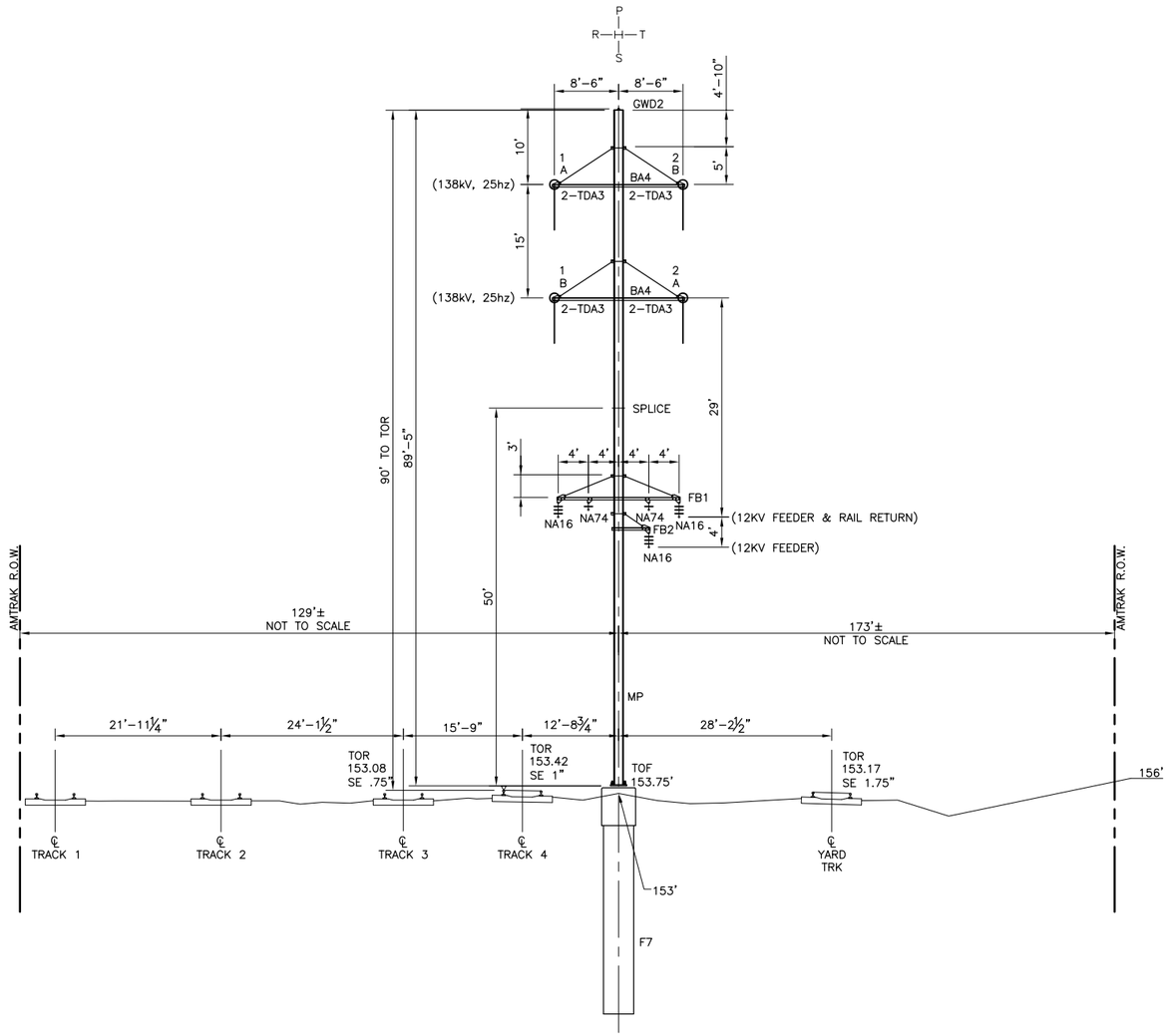
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–21A

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1552.DWG
Ref. No.:	2011–059
Sheet No:	208 OF 347

ET–1552

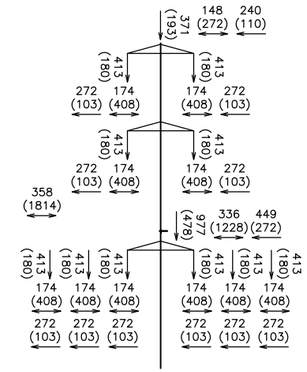
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STRUCTURE ERECTION DIAGRAM SP–20A

225+50
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
275' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
SPS	SIGNAL POWER SUPPORT	ET–1913	1
NA16	FEEDER SUPPORT	ET–1906	3
NA74	RAIL RETURN SUPPORT	ET–1906	2
PC3	SLIDING CLAMP	S–5215	1
MP	MONOPOLE	S–5109	1
F1	FOUNDATION	S–5102	1
BA8	TRANSMISSION BRACKET	S–5206	2
FB1	FEEDER BRACKET – FOUR	S–5226	1
FB2	FEEDER BRACKET – SINGLE	S–5227	1

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL FEEDER WIRE SUPPORT BRACKET.
5. INSTALL STATIC AND TRANSMISSION WIRES.
6. SUPPORT EXISTING FEEDER WIRES.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–20A

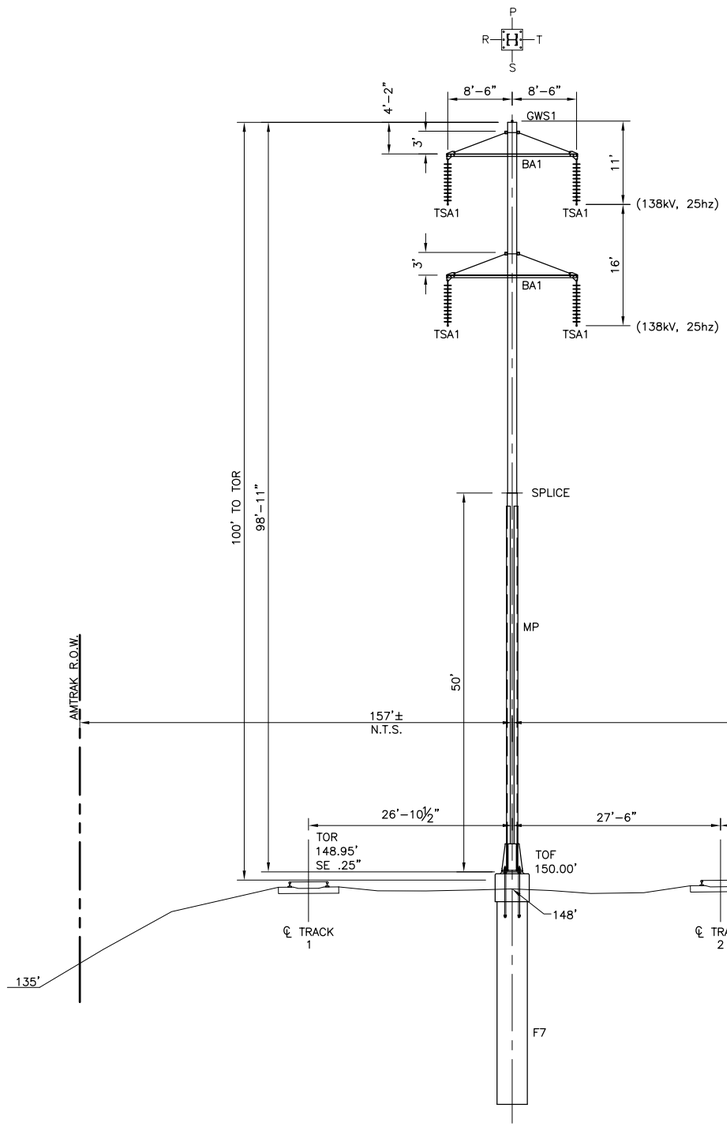
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File No.:	2011–059–ET–1553.DWG
Ref. No.:	2011–059
Sheet No:	209 OF 347

ET–1553

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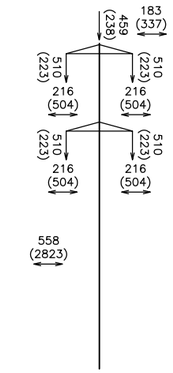
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
MP	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA1	TRANSMISSION BRACKET	S–5200	2



STRUCTURE ERECTION DIAGRAM SP–19A

222+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
340' LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL STATIC AND TRANSMISSION WIRES.

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ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–19A

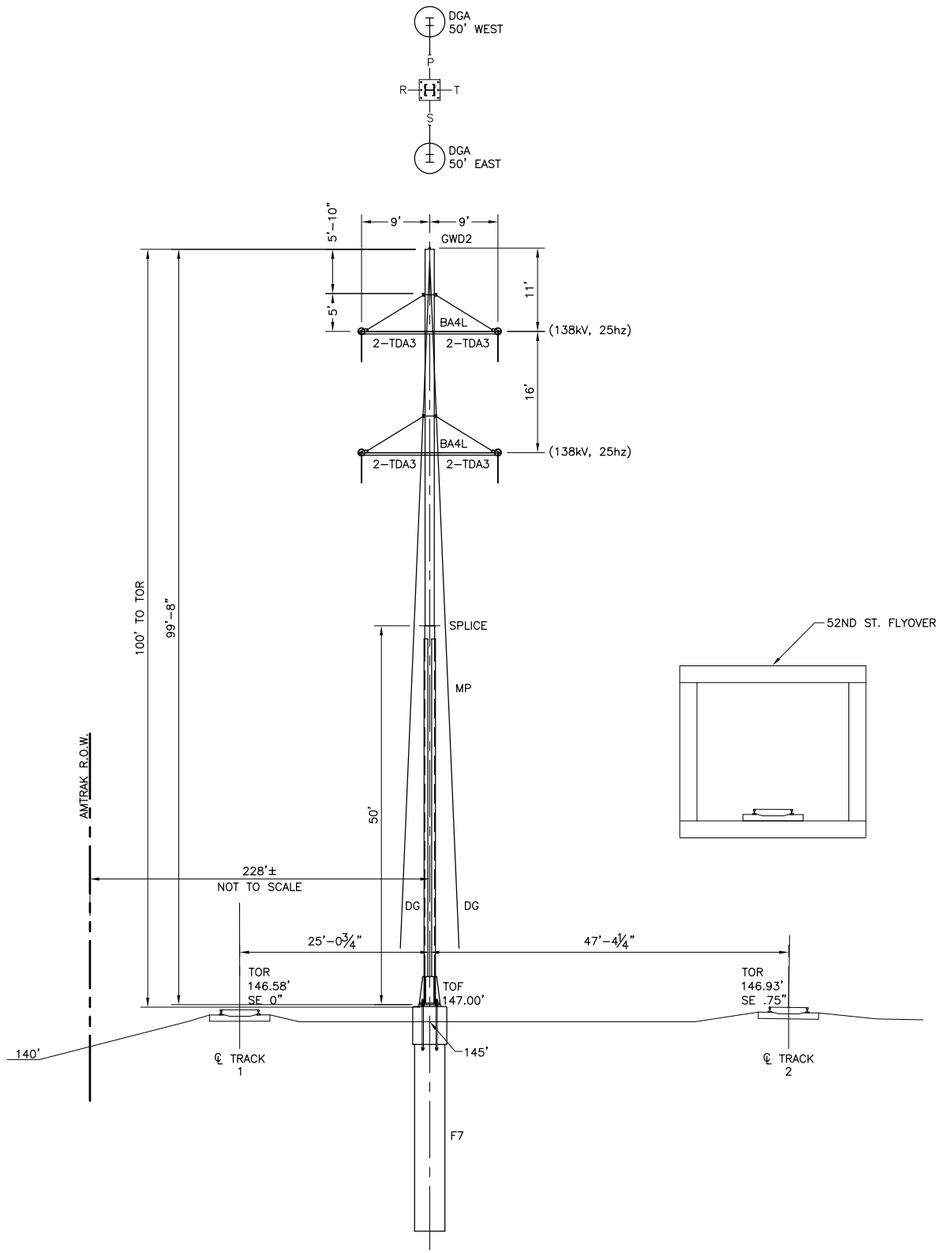
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File No.:	2011–059–ET–1554.DWG
Ref. No.:	2011–059
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ET–1554

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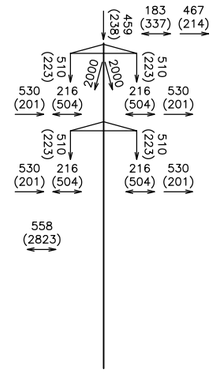
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET-1909	1
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
DG	DOWNGUY	ET-1908	2
MP	MONOPOLE	S-5109	1
F7	FOUNDATION	S-5111	1
BA4L	TRANSMISSION BRACKET	S-5203	2
DGB2	DOWN GUY BRACKET	S-5230	1
DGA	DOWNGUY ANCHOR	S-5101	2



STRUCTURE ERECTION DIAGRAM SP-18A

218+70
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
340' LOAD SPAN
(NOT TO SCALE)

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL STATIC AND TRANSMISSION WIRES.

100% DESIGN SUBMISSION

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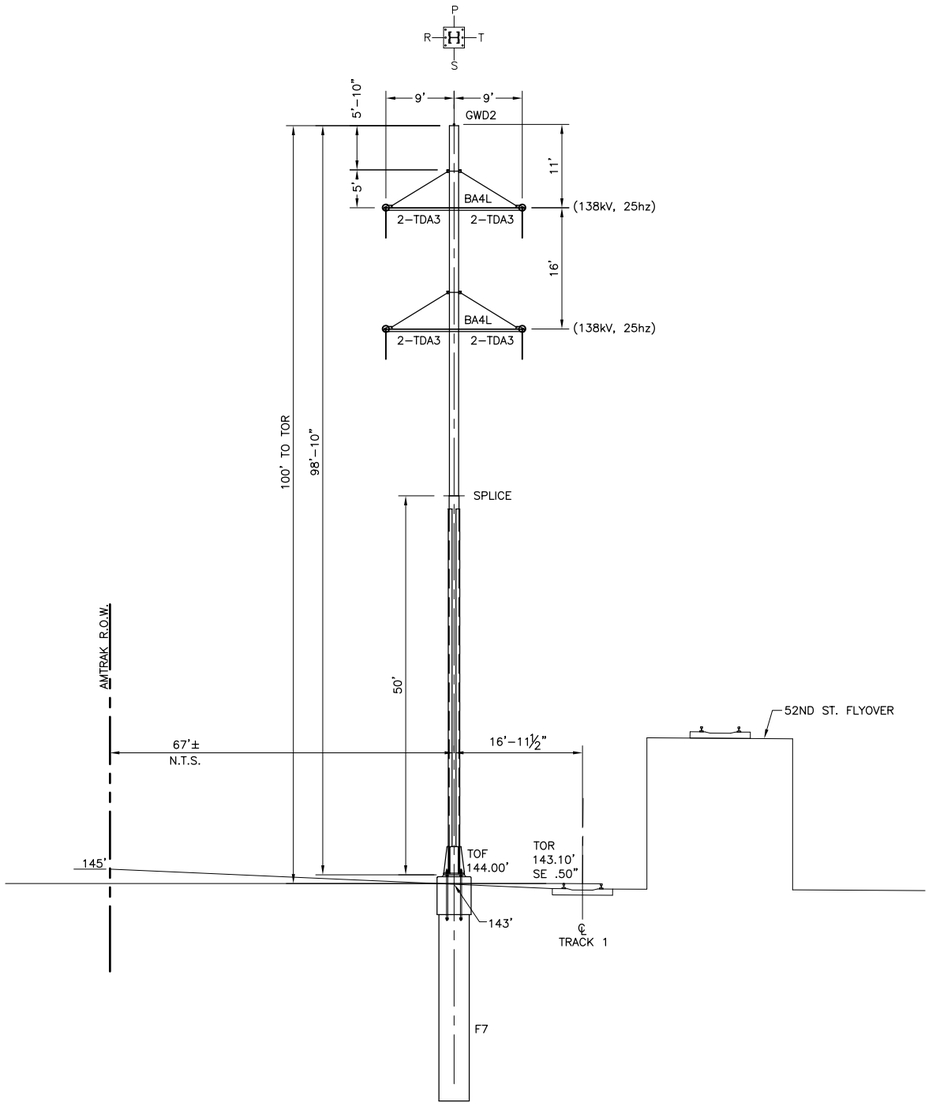
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP-18A

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1555.DWG
Ref. No.:	2011-059
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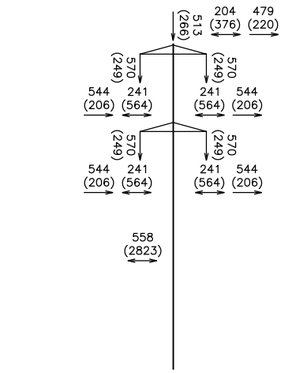
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STRUCTURE ERECTION DIAGRAM SP-17A

215+23
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
380' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE ASSEMBLY	ET-1909	1
TDA3	TRANSMISSION WIRE DEADEND	ET-1800	8
MP	MONOPOLE	S-5109	1
F7	FOUNDATION	S-5111	1
BA4L	TRANSMISSION BRACKET	S-5203	2

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL STATIC AND TRANSMISSION WIRES.

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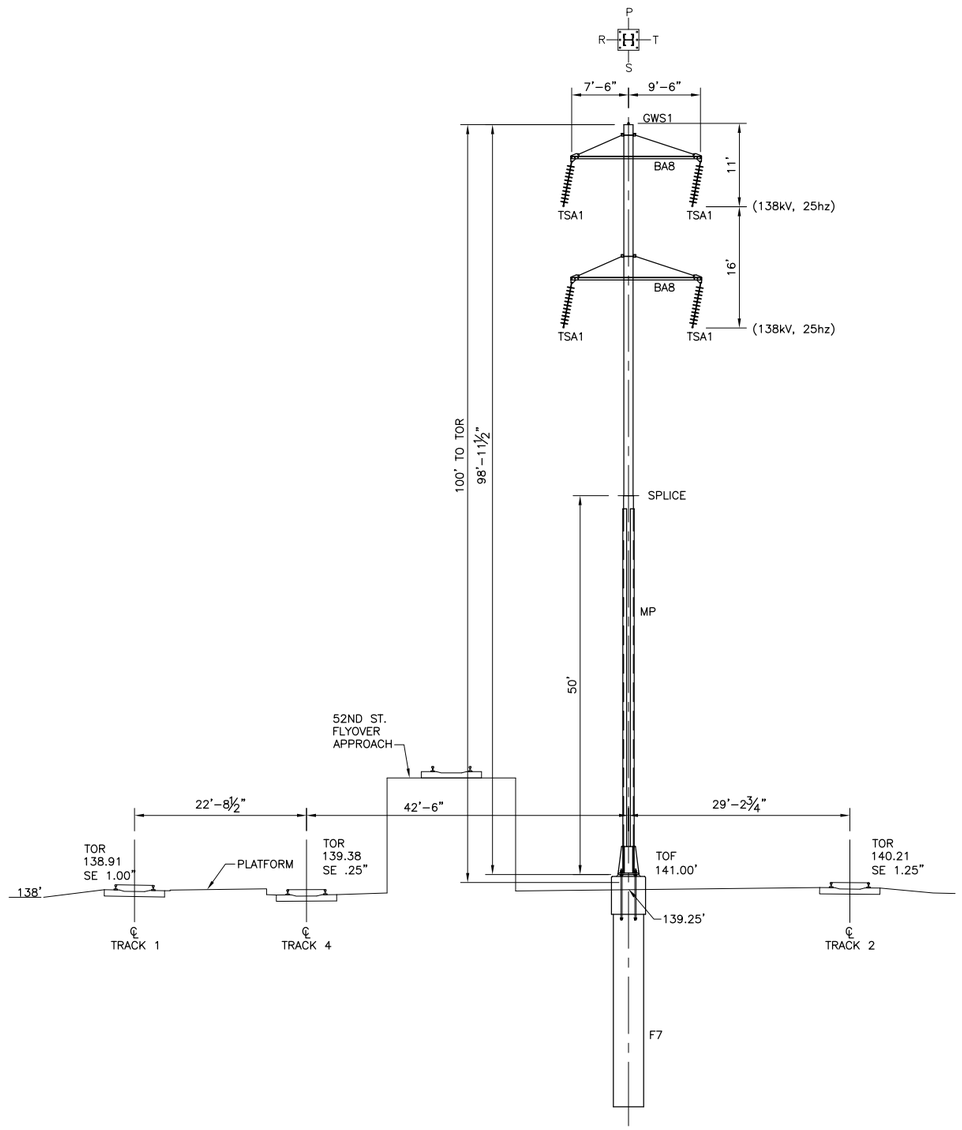
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP-17A

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1556.DWG
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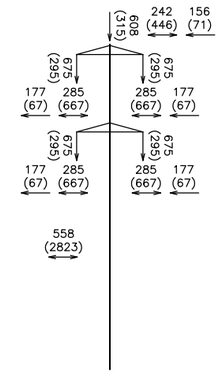
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STRUCTURE ERECTION DIAGRAM SP–16A

211+13
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
450' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWS1	GROUND WIRE ASSEMBLY	ET–1909	1
TSA1	TRANSMISSION WIRE SUPPORT	ET–1800	4
MP	MONOPOLE	S–5109	1
F7	FOUNDATION	S–5111	1
BA8	TRANSMISSION BRACKET	S–5206	2

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL TRANSMISSION BRACKETS.
4. INSTALL STATIC AND TRANSMISSION WIRES.

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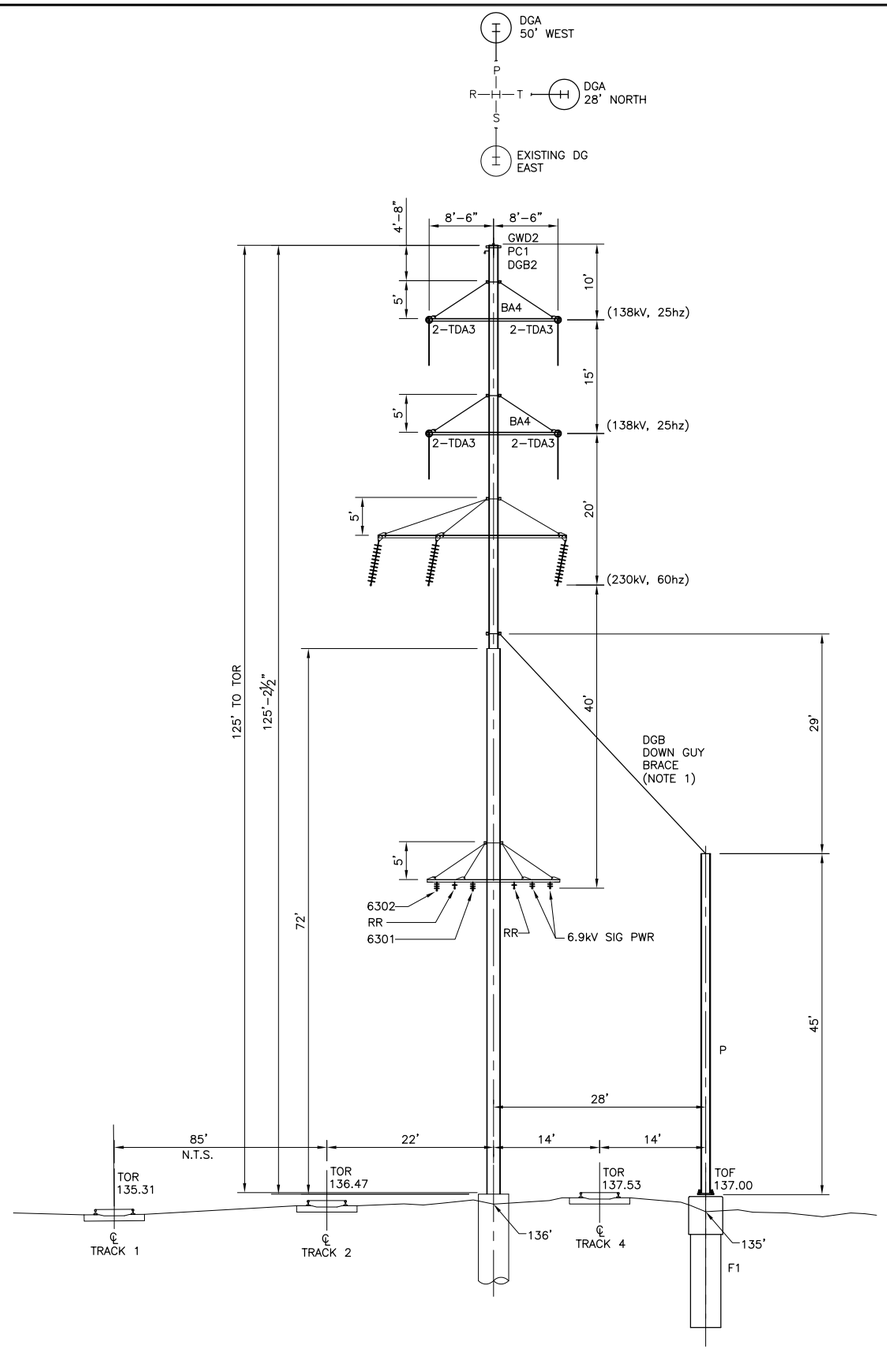
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP–16A

File No.:	2011–059–ET–1557.DWG
Ref. No.:	2011–059
Sheet No:	213 OF 347

ET–1557

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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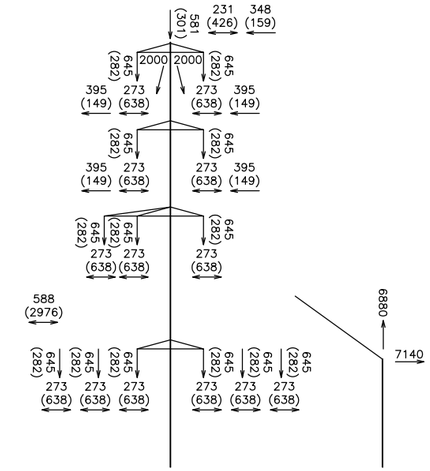
STRUCTURE ERECTION DIAGRAM SP—15

206+85

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
430' LOAD SPAN
(NOT TO SCALE)

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD2	GROUND WIRE DEADEND	ET—1909	1
TDA3	TRANSMISSION DEADEND	ET—1800	8
DG	DOWN GUY	ET—1908	1
BA4	TRANSMISSION BRACKET	S—5203	2
P	POLE	S—5103	1
F1	FOUNDATION	S—5102	1
PC1	SLIDING CLAMP	S—5214	1
DGA	DOWN GUY FOUNDATON	S—5101	1
DGB2	DOWN GUY BRACKET	S—5230	1
DGB	DOWN GUY BRACE	S—5111	1

WORK STATEMENTS:

1. INSTALL FOUNDATIONS.
2. INSTALL BRACING POLE.
3. INSTALL DOWN GUYS.
4. INSTALL DIAGONAL BRACE.
5. INSTALL TRANSMISSION BRACKETS.
6. INSTALL TRANSMISSION DEADEND ASSEMBLIES.

NOTE:

1. SEE DRAWING S—5110 FOR DOWN GUY BRACE DETAILS.

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National Railroad Passenger Corporation
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SP—15

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

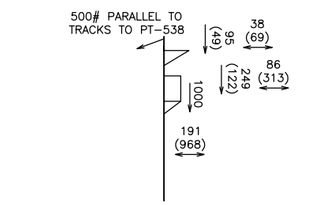
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Ref. No.:	2011—059
Sheet No:	214 OF 347

ET—1558

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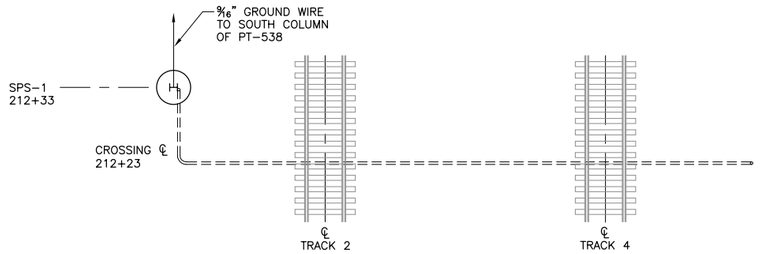
BILL OF MATERIALS SPS–1			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
SPCS2	SIGNAL POWER CUT SECTION		1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
SPP	SIGNAL POWER POLE	S–5123	1
F1	FOUNDATION	S–5102	1
––	9/16" GROUND WIRE	––	40'
––	CONDUITS UNDER TRACK	ET–1930	1

BILL OF MATERIALS PT–538			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
PC1	SLIDING CLAMP	S–5214	1

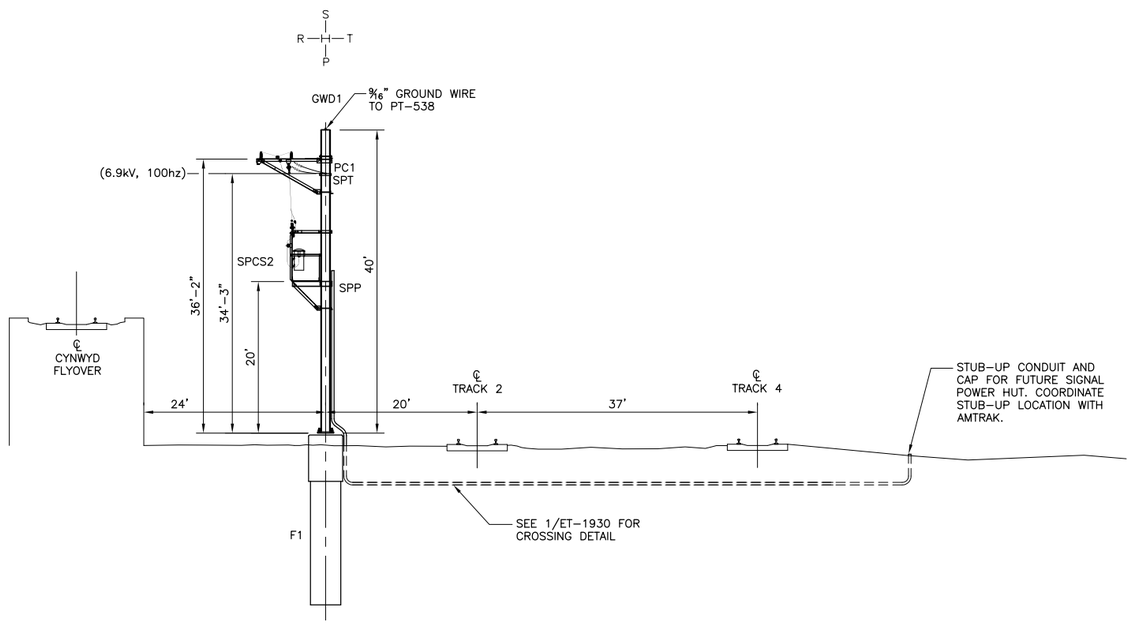


LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
(NOT TO SCALE)



PLAN VIEW



STRUCTURE ERECTION DIAGRAM SPS–1

212+33

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
4. INSTALL INSULATED SIGNAL POWER WIRES.
5. INSTALL MANHOLES, CASING PIPE AND CONDUITS UNDER TRACK.

NOTES:

1. ROUTE LOW VOLTAGE OUTPUT FROM CUT SECTION TO PROPOSED PAXON CIH (BY OTHERS) UNDER TRACKS.
2. SEE ET–0315 FOR CROSSING PLAN.
3. SEE ET–1930 FOR CROSSING DETAIL.

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SPS–1

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

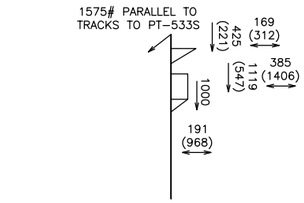
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Ref. No.:	2011–059
Sheet No:	213 OF 347

ET–1559

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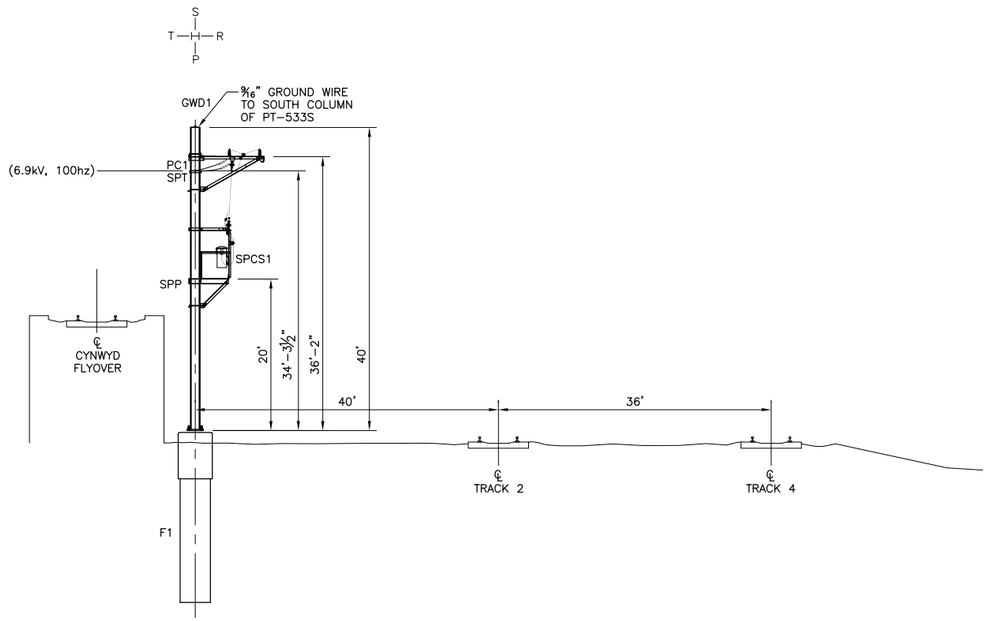
BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
SPT	SIGNAL POWER TERMINATION	ET–1913	1
PC1	SLIDING CLAMP	S–5214	1
SPP	SIGNAL POWER POLE	S–5123	1
F1	FOUNDATION	S–5102	1
––	9/16" GROUND WIRE	––	240'

BILL OF MATERIALS PT–533S			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET–1909	1
PC1	SLIDING CLAMP	S–5214	1



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM SPS–2

208+00
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
4. INSTALL INSULATED SIGNAL POWER WIRES.

NOTES:

1. LOW VOLTAGE OUTPUT FROM CUT SECTION TO PROPOSED VALLEY CIH (BY OTHERS).

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SPS–2

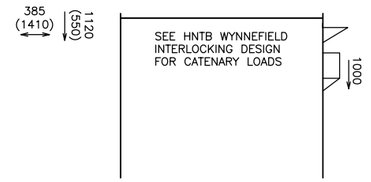
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File No.:	2011–059–ET–1560.DWG
Ref. No.:	2011–059
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ET–1560

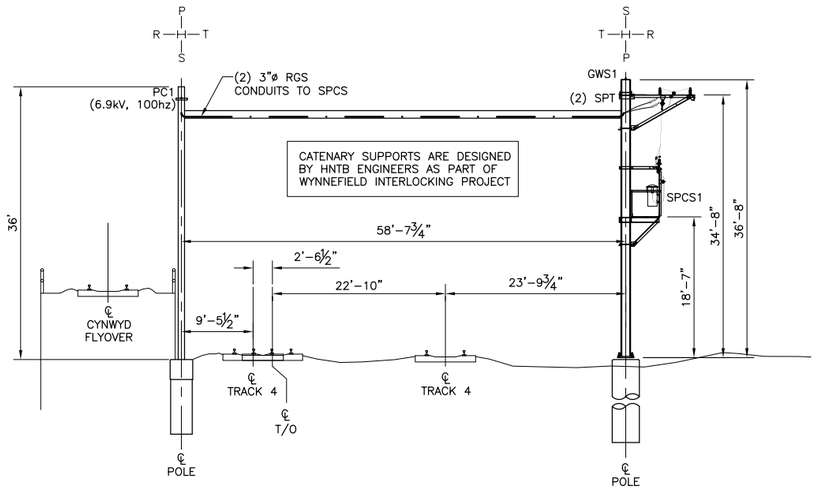
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BILL OF MATERIALS			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
SPCS1	SIGNAL POWER CUT SECTION	ET–1810	1
GWS1	GROUND WIRE ASSEMBLY	ET–1909	2
SPT	SIGNAL POWER TERMINATION	ET–1913	2
PC1	SLIDING CLAMP	S–5214	1
––	3" RGS CONDUIT	––	130'



LOADING DIAGRAM

1/2" RADIAL ICE, 40 MPH WIND, (90 MPH WIND, 60°F)
(NOT TO SCALE)



STRUCTURE ERECTION DIAGRAM PT–525S

186+80
LOOKING TOWARDS HARRISBURG

0 10 20
SCALE: 1"=10'–0"

WORK STATEMENT:

1. INSTALL CONDUITS FOR SIGNAL POWER CABLES.
2. INSTALL INSULATED SIGNAL POWER CABLES IN CONDUITS ACROSS STRUCTURE.
3. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES, AND PLATFORM.

NOTES:

1. LOW VOLTAGE OUTPUT FROM CUT SECTION TO PROPOSED STILES CIH (BY OTHERS).
2. SEE ET–0318 FOR TYPICAL INSULATED SIGNAL POWER ATTACHMENT DETAILS.

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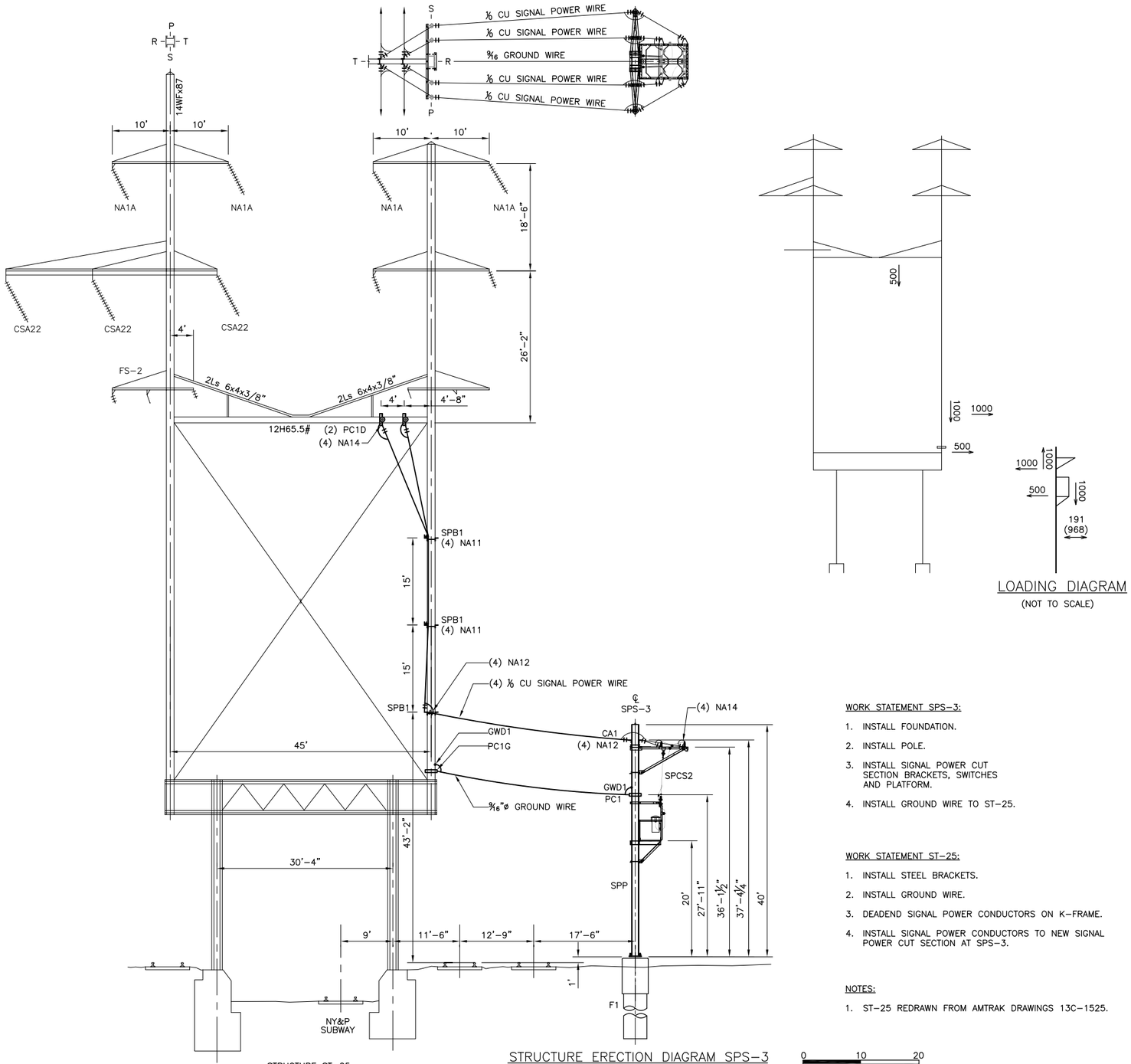
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
PT–525S

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011–059–ET–1561.DWG
Ref. No.:	2011–059
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ET–1561

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STRUCTURE ST-25
STATION 159+60

STRUCTURE ERECTION DIAGRAM SPS-3

STATION 159+60
LOOKING TOWARD HARRISBURG

0 10 20
SCALE: 1"=10'-0"

LOADING DIAGRAM
(NOT TO SCALE)

BILL OF MATERIAL: ST-25			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
NA11	SIGNAL INSULATOR ASSEMBLY	ET-1906	8
GWD1	GROUND WIRE DEADEND	ET-1909	1
NA14	SIGNAL INSULATOR ASSEMBLY	ET-1913	4
NA12	SIGNAL INSULATOR ASSEMBLY	ET-1913	4
SPB1	SIGNAL POWER BRACKET	S-5211	3
PC1G	SLIDING POLE CLAMP	S-5211	1
PC1D	SLIDING POLE CLAMP	S-5211	2
--	1/0 AWG SIGNAL POWER WIRE	--	350'
--	9/16" GROUND WIRE	--	50'

BILL OF MATERIAL: SPS-3			
MARK	DESCRIPTION	REF. DWG.	QUANTITY
GWD1	GROUND WIRE ASSEMBLY	ET-1909	1
SPSC2	SIGNAL POWER CUT SECTION	ET-1811	1
NA12	SIGNAL INSULATOR ASSEMBLY	ET-1913	4
NA14	SIGNAL INSULATOR ASSEMBLY	ET-1913	4
PC1	SLIDING CLAMP	S-5214	1
SPP	SIGNAL POWER POLE	S-5123	1
F1	FOUNDATION	S-5102	1
CA1	CROSS TRACK FEEDER BRACKET	S-5212	1

WORK STATEMENT SPS-3:

1. INSTALL FOUNDATION.
2. INSTALL POLE.
3. INSTALL SIGNAL POWER CUT SECTION BRACKETS, SWITCHES AND PLATFORM.
4. INSTALL GROUND WIRE TO ST-25.

WORK STATEMENT ST-25:

1. INSTALL STEEL BRACKETS.
2. INSTALL GROUND WIRE.
3. DEADEND SIGNAL POWER CONDUCTORS ON K-FRAME.
4. INSTALL SIGNAL POWER CONDUCTORS TO NEW SIGNAL POWER CUT SECTION AT SPS-3.

NOTES:

1. ST-25 REDRAWN FROM AMTRAK DRAWINGS 13C-1525.

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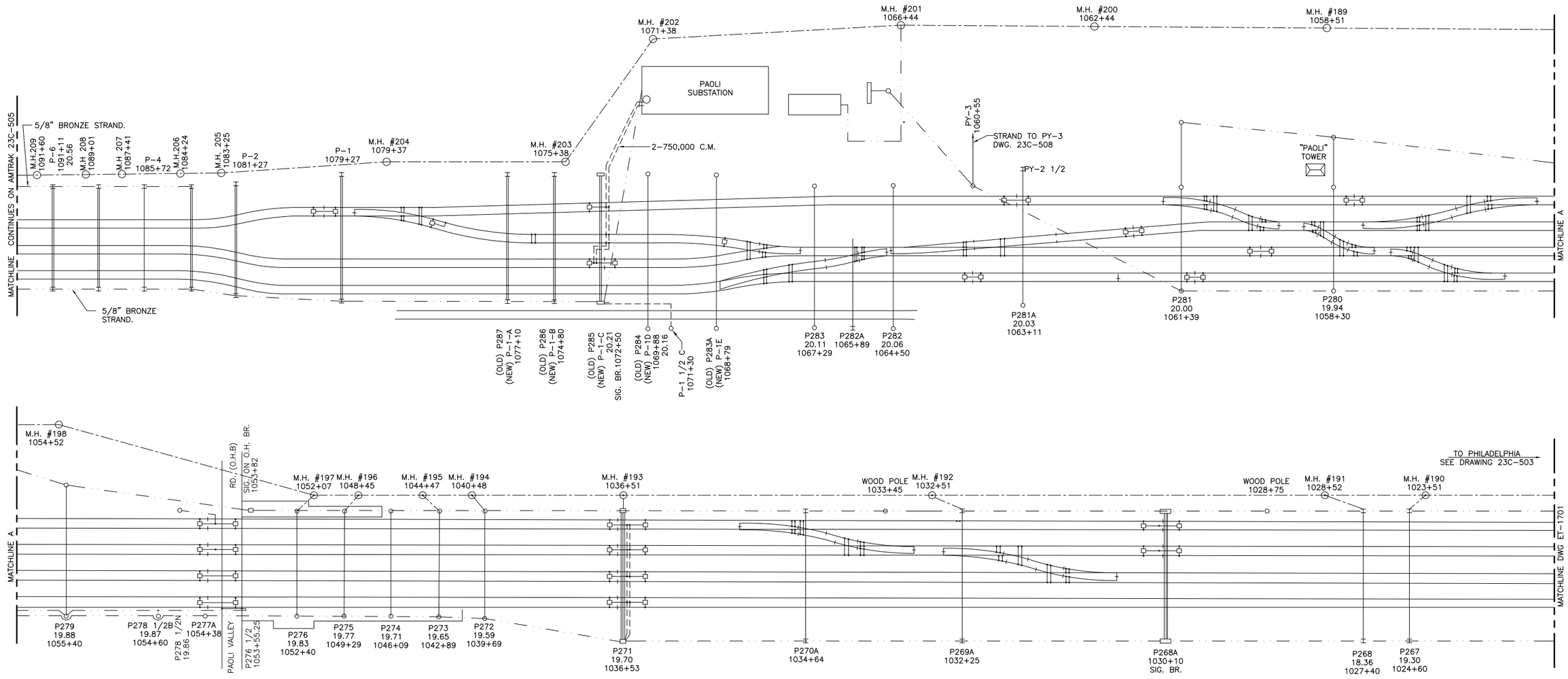
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL ERECTION DIAGRAM
SPS-3

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	2011-059-ET-1562.DWG
Ref. No.:	2011-059
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ET-1562

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-504-16

KEY:

GROUND WIRE (⅝ COPPER UNLESS NOTED)

NEUTRALIZING WIRE IN DUCT LINE (⅝ COPPER, BARE)

RAIL NOT BONDED FOR PROPULSION

RAIL BONDED FOR PROPULSION

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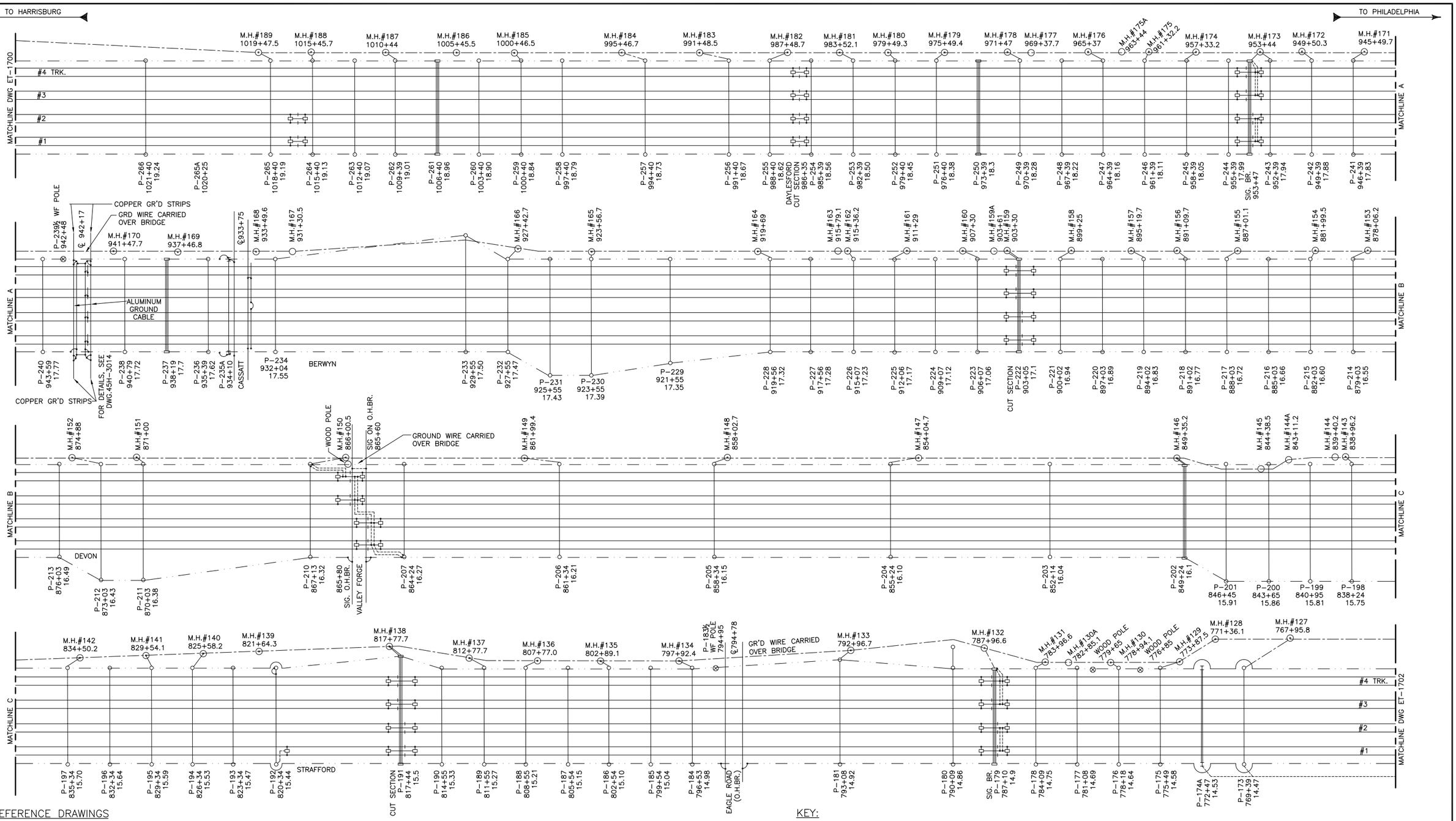
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN EXISTING, SHEET 1 OF 6

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1700.DWG
Ref. No.:	2011-059
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ET-1700

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-503-11

KEY:

GROUND WIRE (℄ COPPER UNLESS NOTED) — · — · —

NEUTRALIZING WIRE IN DUCT LINE (℄ COPPER, BARE) — · — · —

RAIL NOT BONDED FOR PROPULSION - - - - - -

RAIL BONDED FOR PROPULSION ———

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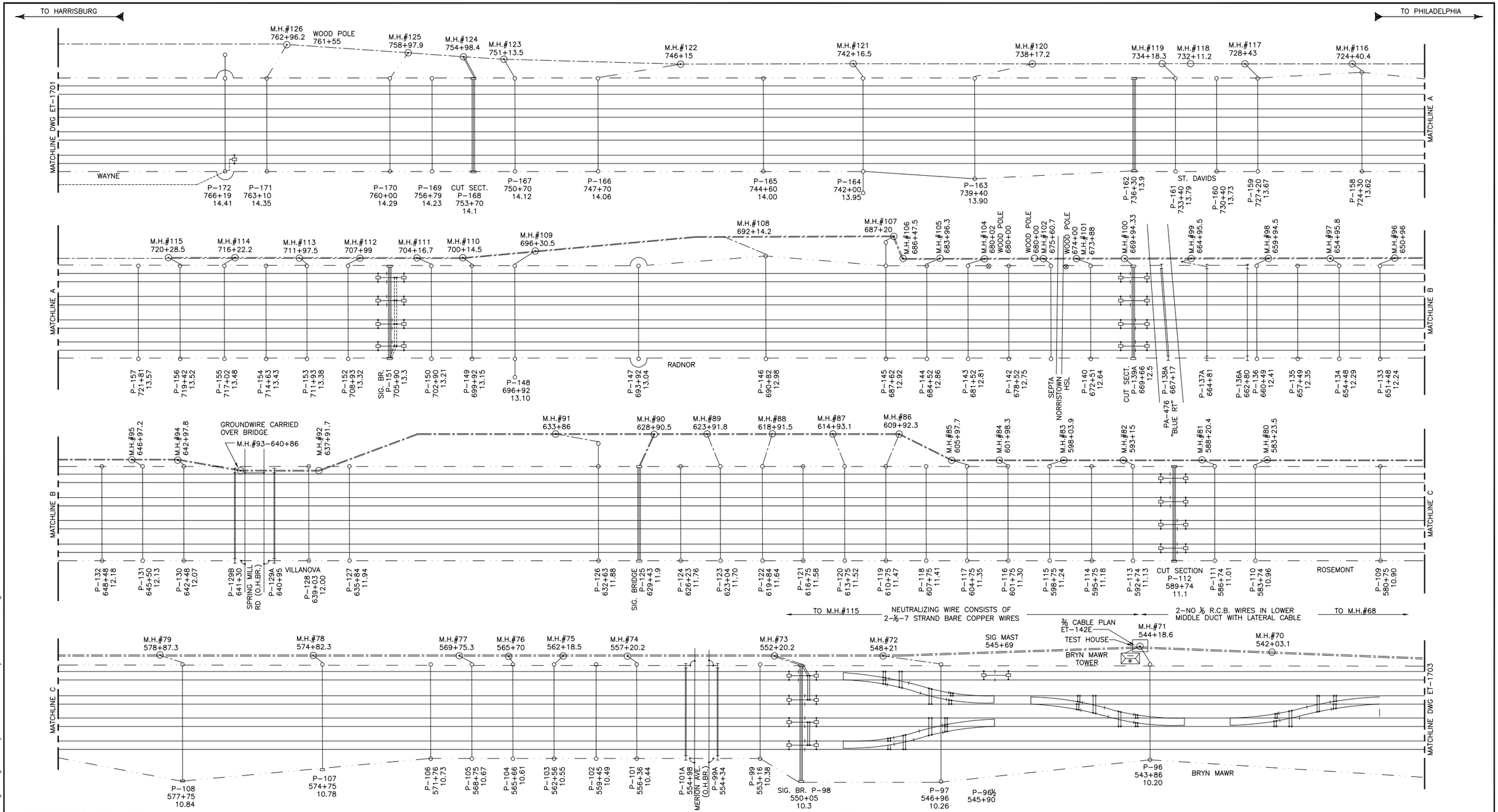
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN EXISTING, SHEET 2 OF 6

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File No.:	2011-059-ET-1701.DWG
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ET-1701

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-502-9

KEY:

GROUND WIRE (⅜ COPPER UNLESS NOTED)

NEUTRALIZING WIRE IN DUCT LINE (⅜ COPPER, BARE)

RAIL NOT BONDED FOR PROPULSION

RAIL BONDED FOR PROPULSION

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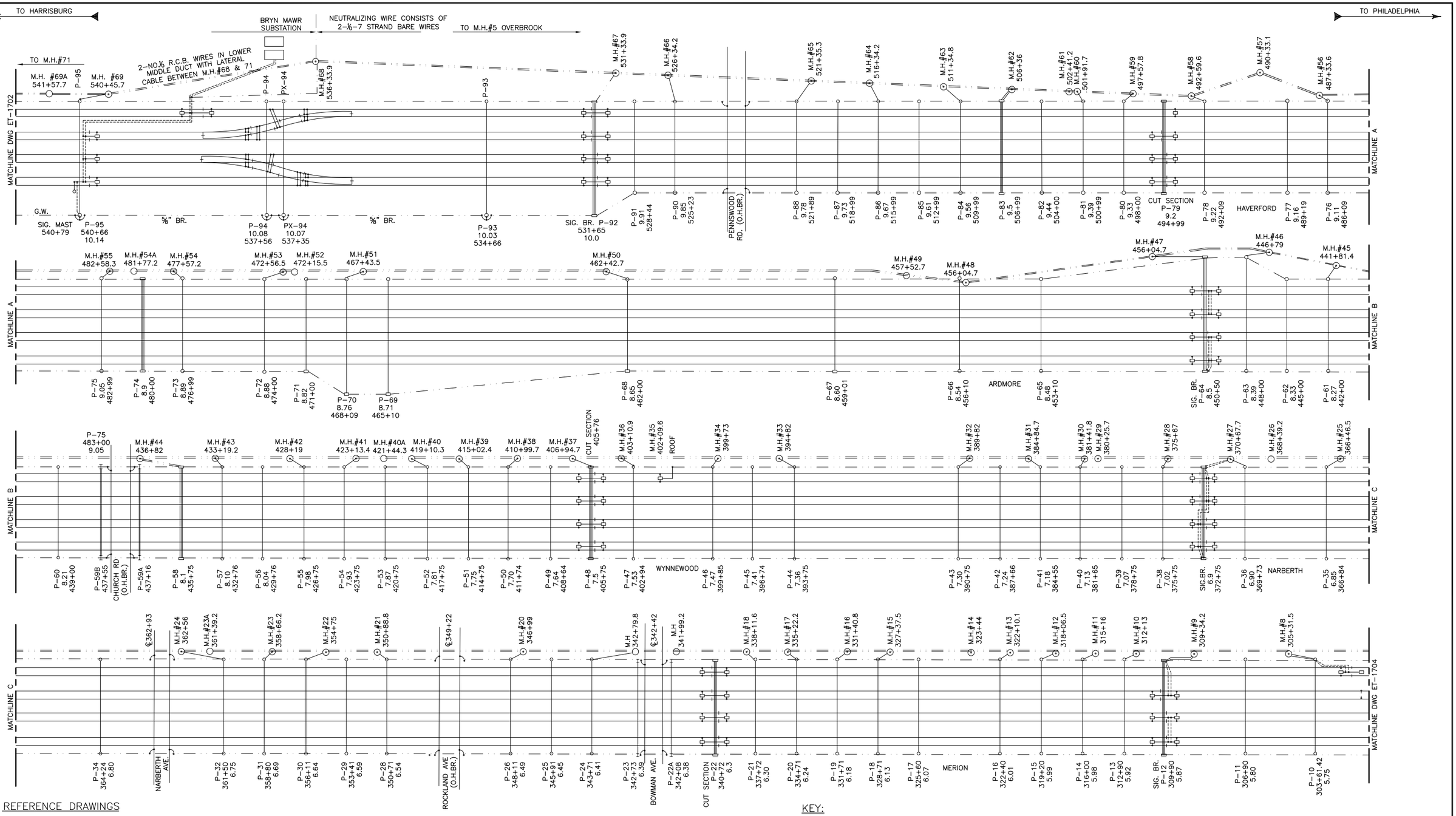
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN EXISTING, SHEET 3 OF 6

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1702.DWG
Ref. No.:	2011-059
Sheet No:	219 OF 347

ET-1702

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-501-8

KEY:

GROUND WIRE (⅝ COPPER UNLESS NOTED)

NEUTRALIZING WIRE IN DUCT LINE (⅝ COPPER, BARE)

RAIL NOT BONDED FOR PROPULSION

RAIL BONDED FOR PROPULSION

100% DESIGN SUBMISSION

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN EXISTING, SHEET 4 OF 6

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

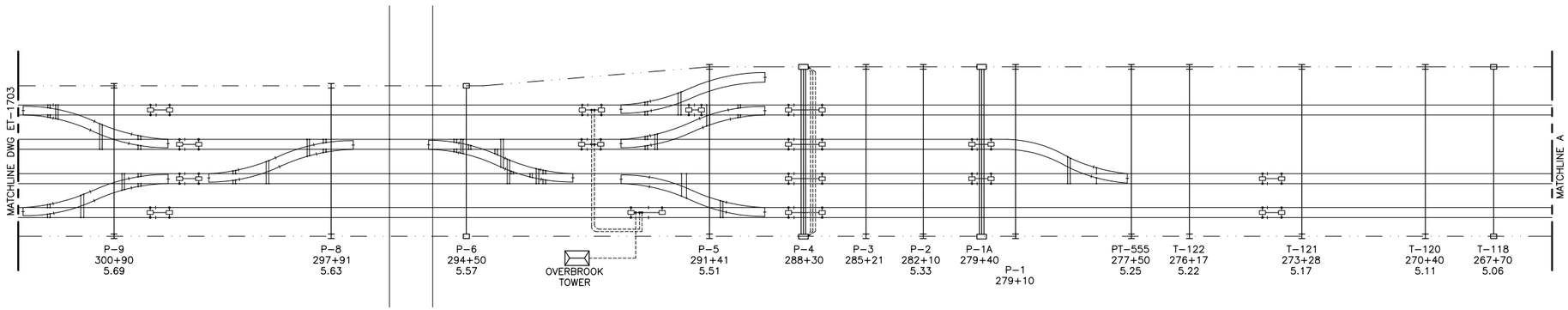
File No.:	2011-059-ET-1703.DWG
Ref. No.:	2011-059
Sheet No:	220 OF 347

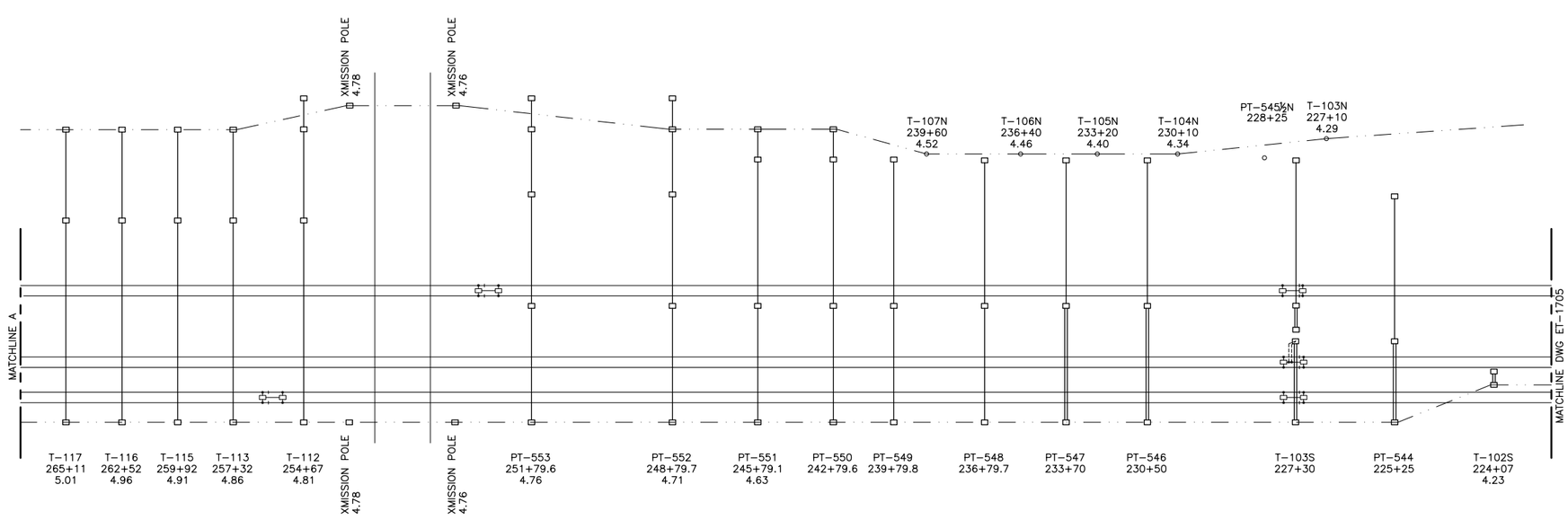
ET-1703

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TO HARRISBURG

TO PHILADELPHIA





REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-500-18 and 29C-448-9

KEY:

GROUND WIRE (⅝ COPPER UNLESS NOTED)

NEUTRALIZING WIRE IN DUCT LINE (⅝ COPPER, BARE)

RAIL NOT BONDED FOR PROPULSION

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GROUNDING AND BONDING PLAN EXISTING, SHEET 5 OF 6

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

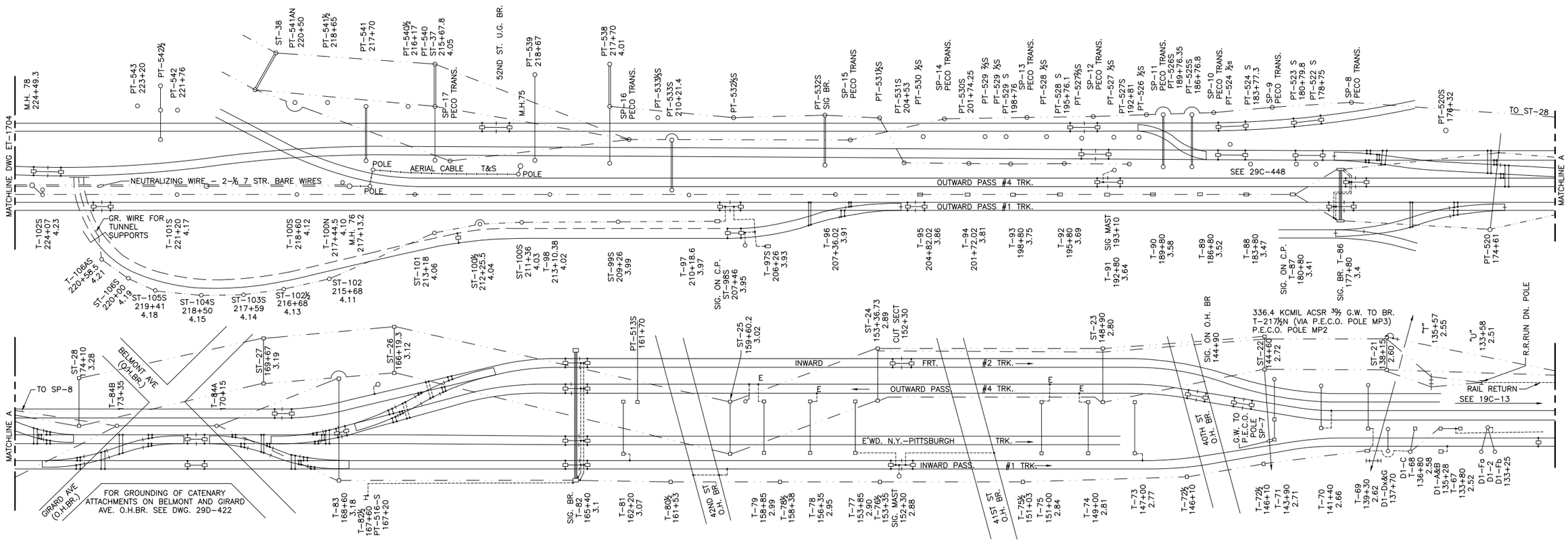
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Ref. No.:	2011-059
Sheet No:	221 OF 347

ET-1704

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TO HARRISBURG

TO PHILADELPHIA



REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-500-18 and 29C-448-9

KEY:

GROUND WIRE (#6 COPPER UNLESS NOTED)

NEUTRALIZING WIRE IN DUCT LINE (#6 COPPER, BARE)

RAIL NOT BONDED FOR PROPULSION

RAIL BONDED FOR PROPULSION

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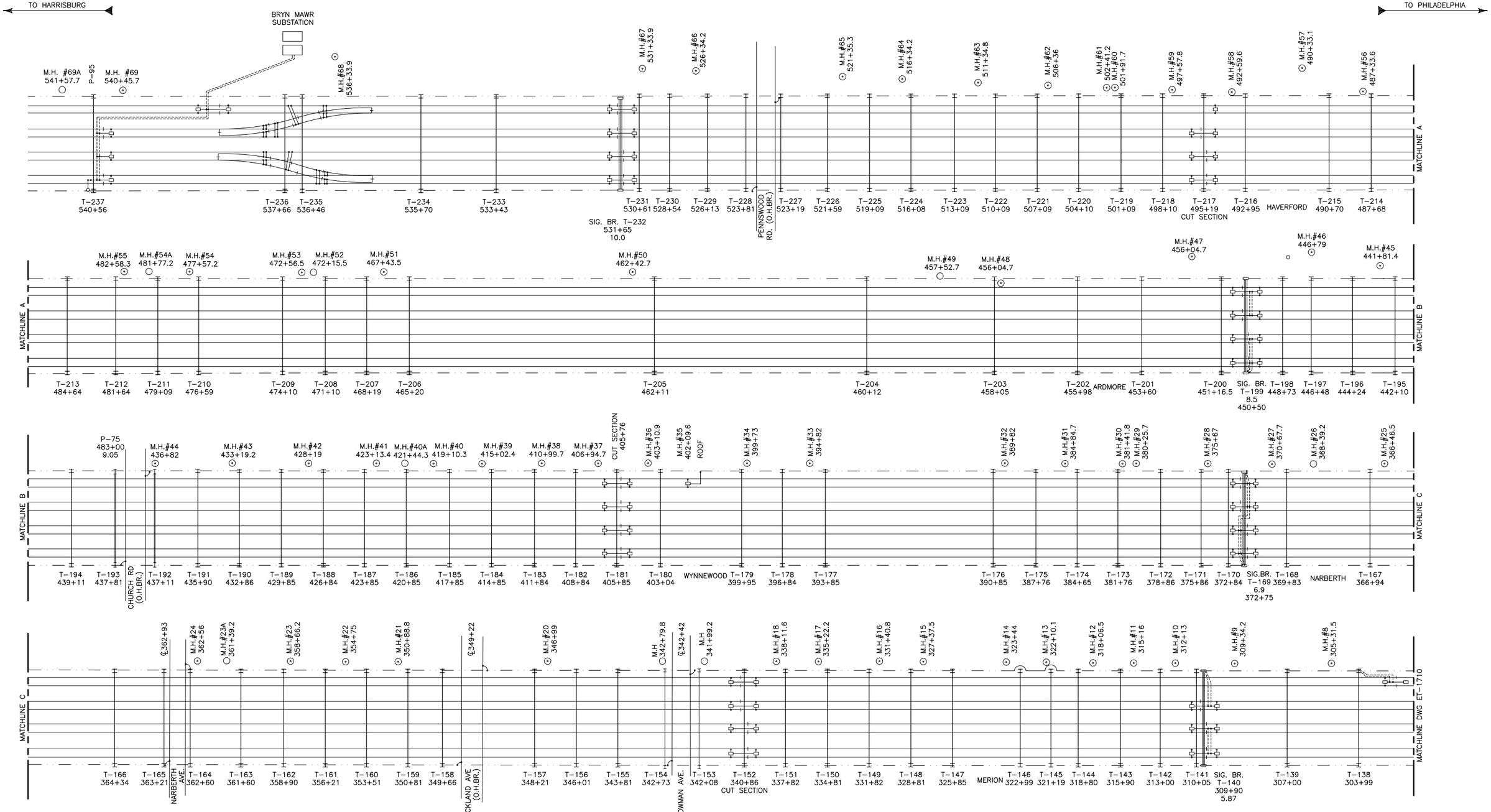
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN EXISTING, SHEET 6 OF 6

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1705.DWG
Ref. No.:	2011-059
Sheet No:	222 OF 347

ET-1705

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET-1120-C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET-1121-C
3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
4. NEUTRALIZING WIRE CONNECTION DETAILS ET-561-E
5. REDRAWN FROM AMTRAK 23C-501-8

KEY:

GROUND WIRE (⅝ COPPER UNLESS NOTED) — · — · — · —

RAIL NOT BONDED FOR PROPULSION - - - - - - - - - - - -

RAIL BONDED FOR PROPULSION ————————

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

GROUNDING AND BONDING PLAN PROPOSED, SHEET 1 OF 3

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

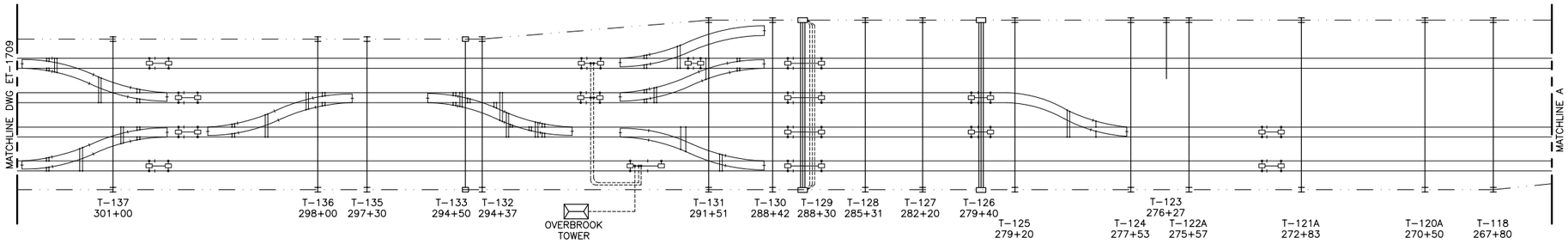
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Ref. No.:	2011-059
Sheet No:	223 OF 347

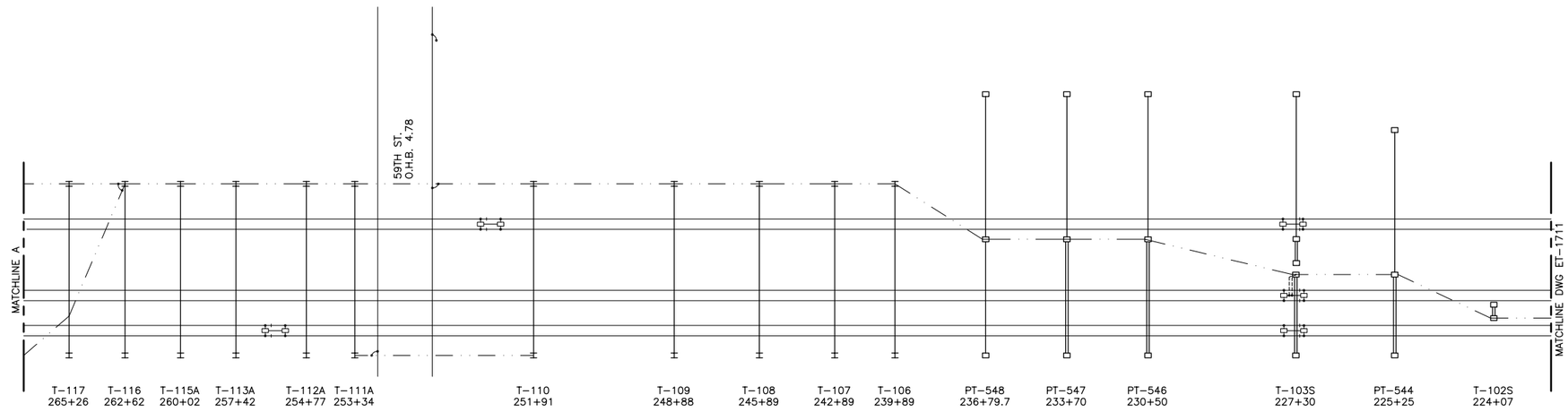
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TO HARRISBURG

TO PHILADELPHIA





REFERENCE DRAWINGS

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3. STANDARD BONDING 7 INSULATION OF SWITCHES S-803
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5. REDRAWN FROM AMTRAK 23C-500-18 and 29C-448-9

KEY:

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NEUTRALIZING WIRE IN DUCT LINE (⅝ COPPER, BARE)

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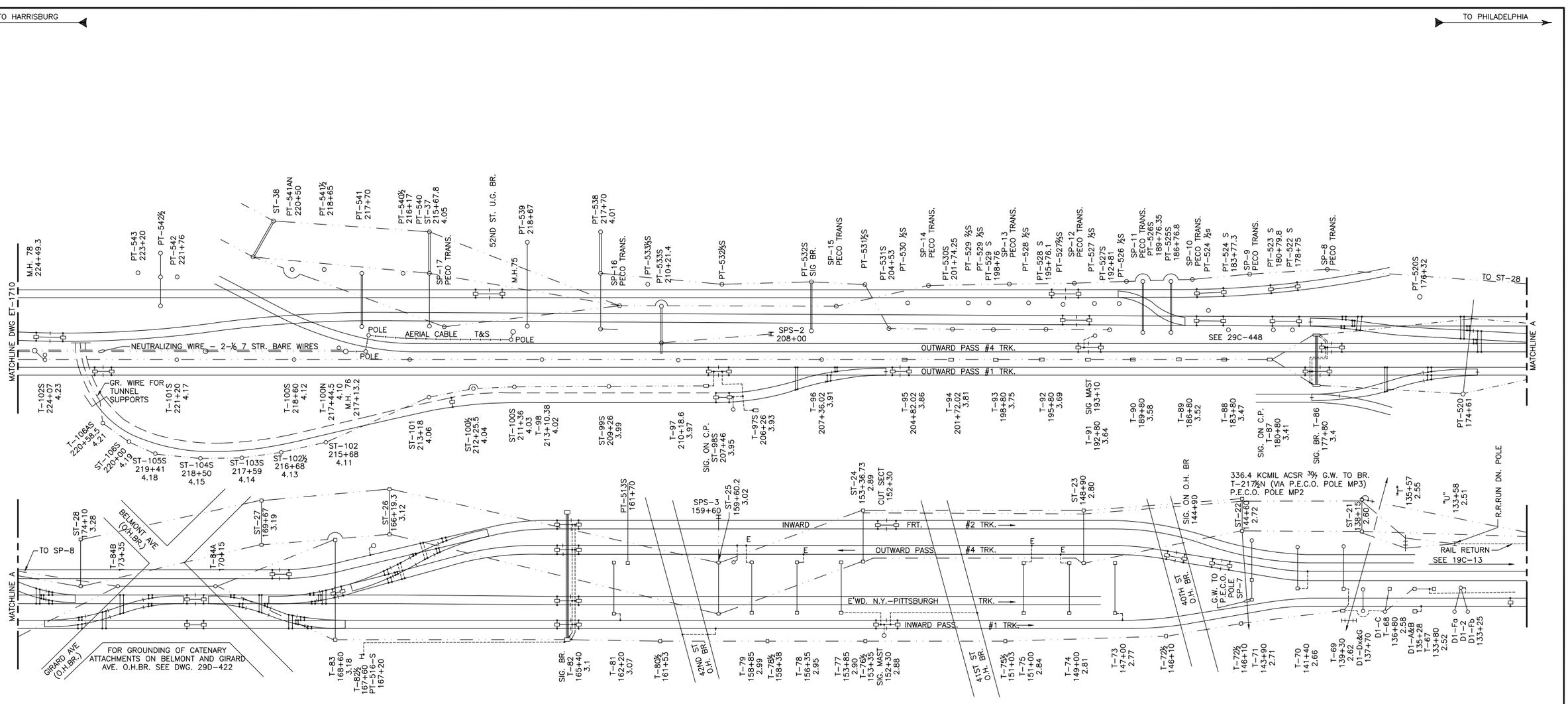
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN PROPOSED, SHEET 2 OF 3

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1710.DWG
Ref. No.:	2011-059
Sheet No:	224 OF 347

ET-1710

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REFERENCE DRAWINGS

1. TYPICAL DETAILS FOR POWER BONDING OF STRUCTURES ET–1120–C
2. TYPICAL DETAILS FOR POWER BONDING OF RAILS ET–1121–C
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KEY:

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GROUNDING AND BONDING PLAN PROPOSED, SHEET 3 OF 3

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

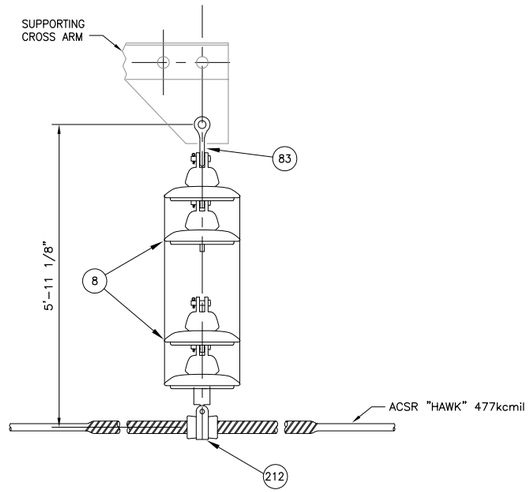
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Ref. No.:	2011–059
Sheet No:	225 OF 347

ET–1711

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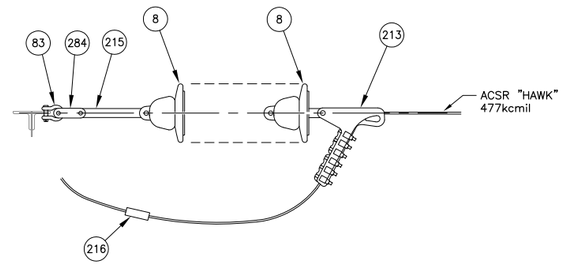
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ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	11
83	S4	SHACKLE WITH BOLT	ET–305E	1
212	–	ARMOR GRIP SUSPENSION, AGS–5118	---	1

EXCEPT FURNISH WITH "J" BOLTS



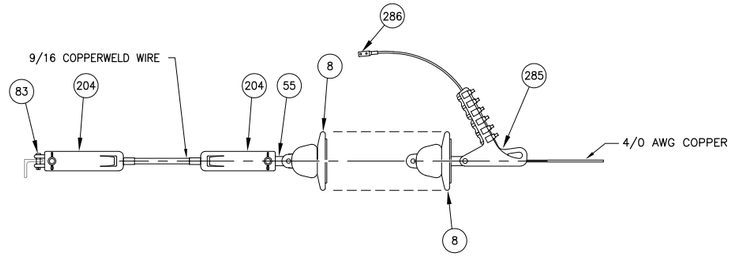
SUSPENSION ASSEMBLY "TSA1"
SCALE: NONE

BILL OF MATERIAL				
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8	B1	INSULATOR	ET1–003	13
83	S4	SHACKLE W/ BOLT	ET–305E	1
213	–	DEADEND QUADRANT MACLEAN POWER SYSTEMS ADE–24–C	---	1
284	–	CLEVIS FITTING CCC30	---	1
215	–	GALVANIZED STRAP 1/2"x2"x12"	---	1
216	–	COMPRESSION SPLICE HUBBLE POWER SYSTEMS JLS1010	---	1



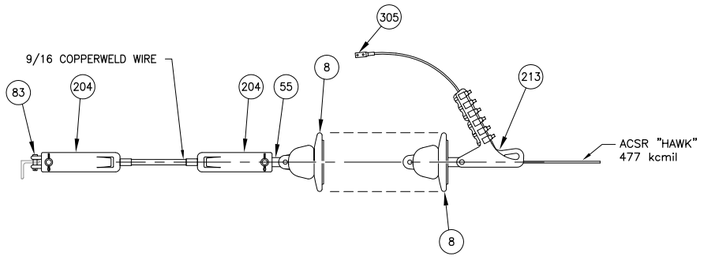
DEADEND ASSEMBLY "TDA3"
NO GRADING SHIELDS
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	13
55	LK2	5/8" CHAIN LINK, CROSBY	–	1
83	S4	SHACKLE W/ BOLT	ET–305E	1
204	–	FORK COLLAR SOCKET, ARTHUR FLURRY NO. 610.090.000	–	2
285	–	DEADEND QUADRANT CLAMP, BRZ ANDERSON BSD–68N	–	1
286	–	TERMINAL LUG, 4/0 AWG COPPER, COMPRESSION TYPE, BURNDY YS–282N	–	1



DEADEND ASSEMBLY FOR 4/0 COPPER "TDA3S1"
NO GRADING SHIELDS
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	13
55	LK2	5/8" CHAIN LINK, CROSBY	–	1
83	S4	SHACKLE W/ BOLT	ET–305E	1
204	–	FORK COLLAR SOCKET, ARTHUR FLURRY NO. 610.090.000	–	2
213	–	DEADEND QUADRANT MACLEAN POWER SYSTEMS ADE–24–C	–	1
305	–	TERMINAL LUG, TIN PLATED, ANDERSON/HUBBELL SWH050C	–	1



DEADEND ASSEMBLY FOR 477 ACSR "TDA3S2"
NO GRADING SHIELDS
SCALE: NONE

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IN ASSOCIATION WITH
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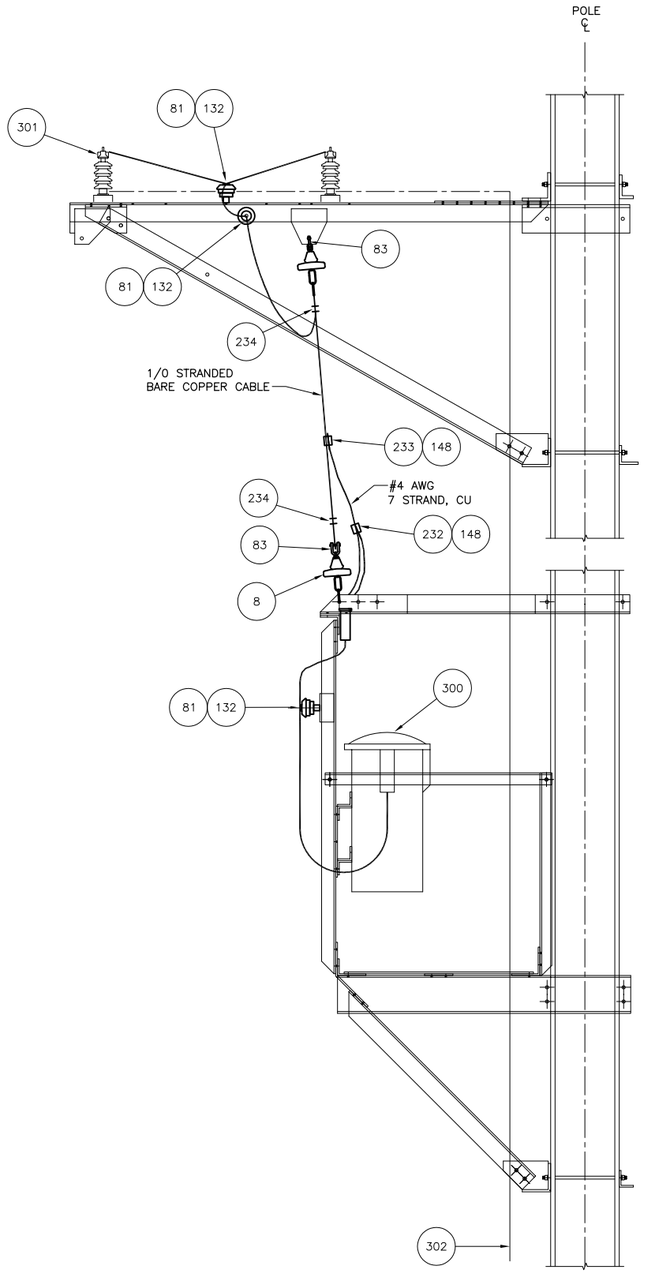
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS TRANSMISSION ASSEMBLIES

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1800.DWG
Ref. No.:	2011–059
Sheet No:	226 OF 347

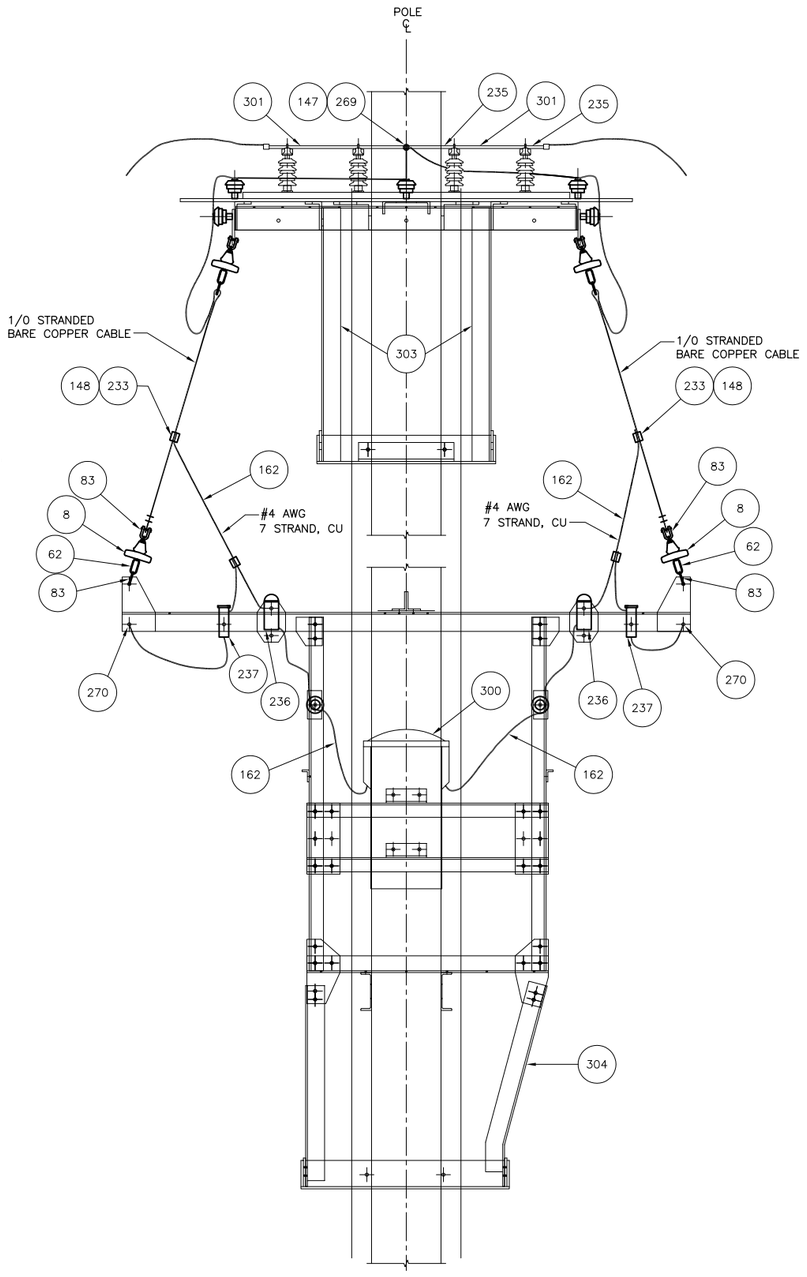
ET–1800

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ELEVATION ALONG TRACKS

NOT TO SCALE



ELEVATION ACROSS TRACKS

NOT TO SCALE

BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	REFERENCE DRAWING	MANUFACTURER OR AMTRAK PART #	QTY.
		SIGNAL POWER EQUIPMENT			
300		SIGNAL POWER TRANSFORMER, OIL FILLED 6.9KV TO 240V/120V, 10KVA		44–300–44301	1
301		DISCONNECT SWITCH DPST, 15KV, 600A, W/ALL OPERATING RODS AND HARDWARE, SEE NOTE 2		44–015–20258	2
302		MANUAL OPERATOR FOR DISCONNECT SWITCH	S–5216		2
303		SIGNAL POWER SWITCH PLATFORM	S–5216		1
304		SIGNAL POWER TRANSFORMER PLATFORM	S–5216		1
		CATENARY EQUIPMENT			
8	B1	INSULATOR, 10" PORCELAIN		44–770–04402	4
62	ND–1	ADAPTER, CLEVIS TYPE, MALLEABLE IRON, GALVANIZED	ET–449E	44–562–00201	4
81	S	INSULATOR, PIN TYPE	ET1–003	442400111	8
83	S–4	SHACKLE, CHAIN TYPE, FORGED STEEL, GALVANIZED	ET–305E	44–562–27009	6
132		PIN, FOR TYPE–S INSULATOR	ET–288–E4	44–240–0111X	8
147		CARTRIDGE, WHITE, AMPACT# 69338–5		44–423–00607	2
148		CARTRIDGE, RED, AMPACT 69338–2		44–015–00309	4
162		CABLE, #4 AWG, 7 STRAND, HD COPPER PE COVERED		44–045–02355	50'
232		TAP, CABLE WEDGE, #4 TO #4 277060–3		–	2
233		TAP, CABLE WEDGE, 1/0 TO #4 277060–1		–	2
234		CLIP, 3/8" CABLE, BRONZE, BRIDESBURG FOUNDRY WIRE LOCK		44–045–09901	8
235		LUG – FOR 1/0, COMP. TYPE		02–180–03562	8
236		CUTOUT FUSE, ENCLOSED, 7.8KV, 50 AMP		44–950–01600	2
237		LIGHTNING ARRESTOR, 9KV		02–949–50705	2
269		TAP, 1/0 CU. TO 1/0 CU. AMPACT# 1–275187–8		44–230–02004	2
270		SERVIT POST, #4 AWG TO FLAT, BURNDY KC23, 1/2–13 STUD			2
–		TIE WIRE, #4 AWG, BARE COPPER SOLID SOFT DRAWN		–	27'
–		CONDUCTOR, 1/0 7 STRAND HD COPPER		44–045–00202	25'

NOTES:

1. SECONDARY INSULATED CABLE AND CONDUIT FURNISHED AND INSTALLED BY C&S DEPARTMENT.
2. SWITCH UNITS TO BE SUPPLIED WITH 2 SETS COMPLETE OF OPERATION RODS WITH NECESSARY GUIDES, BEARINGS UNIVERSALS, LOCKING AND MANUAL OPERATORS BY SWITCH MANUFACTURER.

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IN ASSOCIATION WITH

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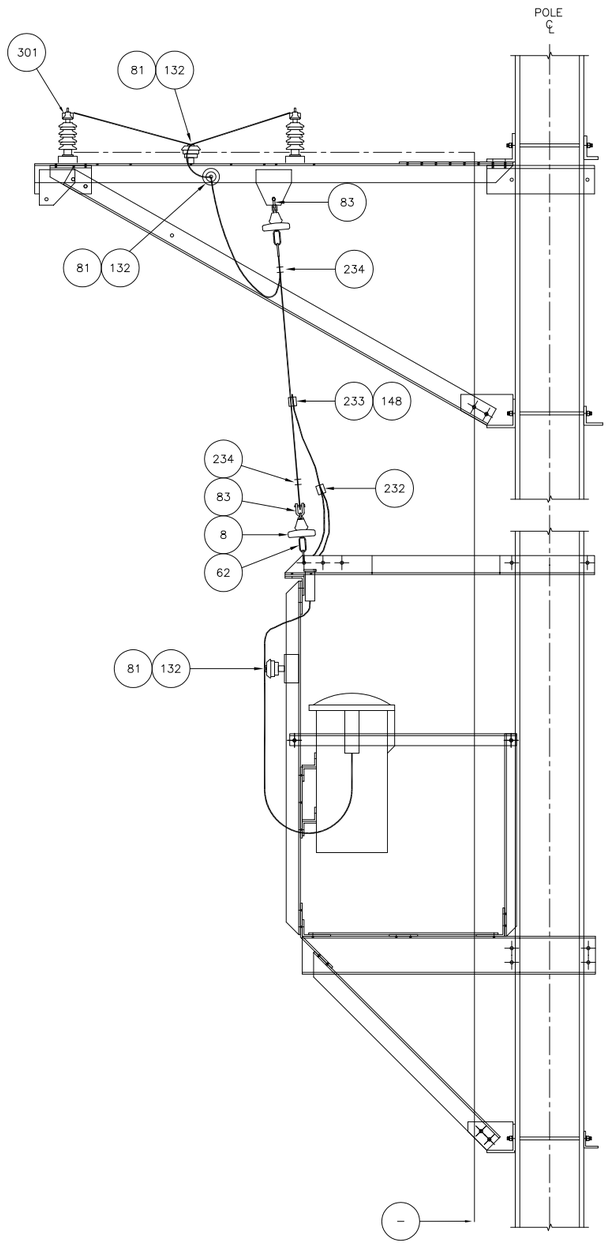
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
SINGLE TRANSFORMER, MANUAL OPERATORS

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1810.DWG
Ref. No.:	2011–059
Sheet No:	227 OF 347

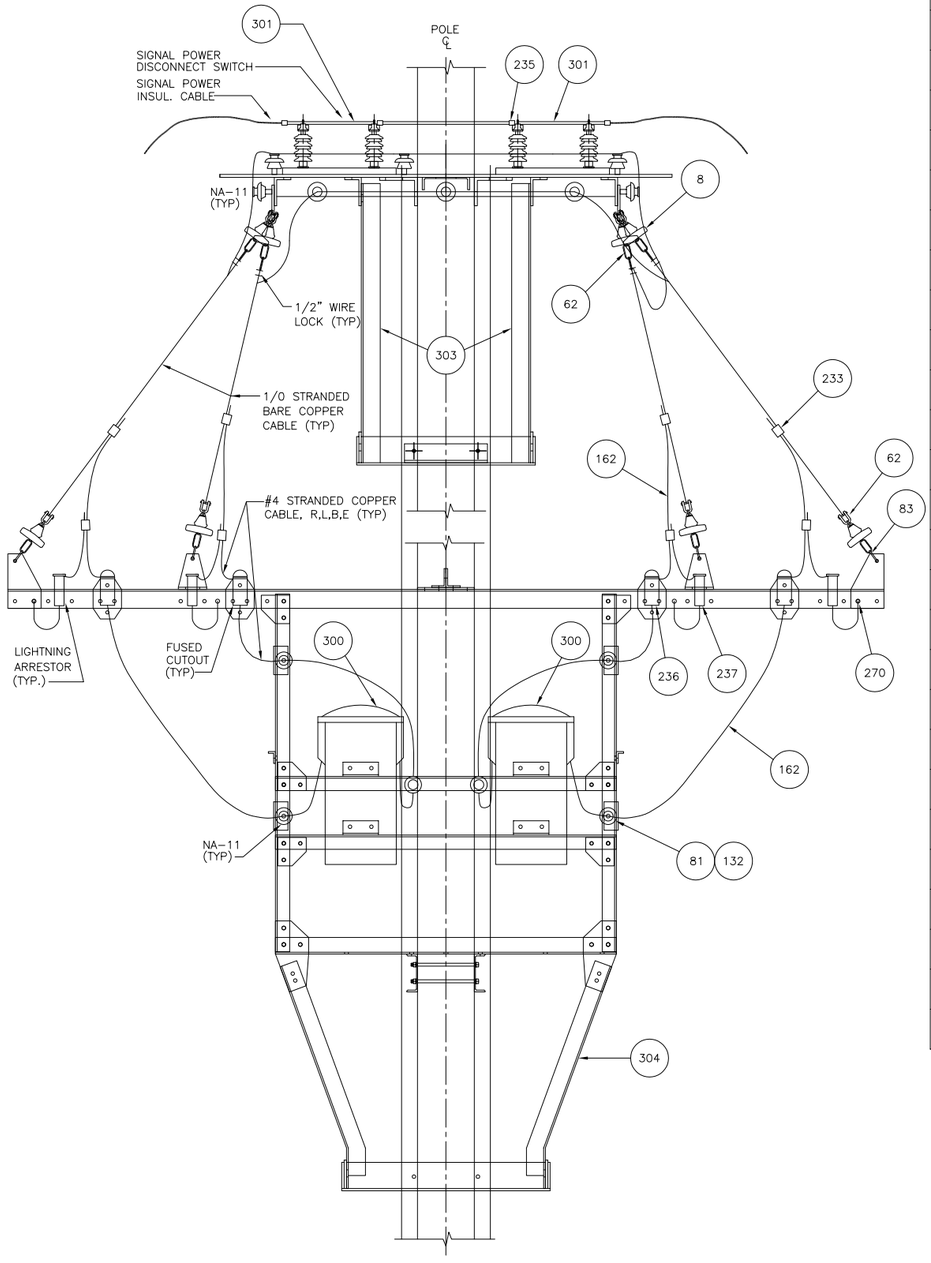
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ELEVATION ALONG TRACKS

NOT TO SCALE



ELEVATION ACROSS TRACKS

NOT TO SCALE

BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	REFERENCE DRAWING	MANUFACTURER OR AMTRAK PART #	QTY.
		SIGNAL POWER EQUIPMENT			
300		SIGNAL POWER TRANSFORMER, OIL FILLED 6.9KV TO 240V/120V, 10KVA		44–300–44301	2
301		DISCONNECT SWITCH DPST, 15KV, 600A, W/ALL OPERATING RODS AND HARDWARE, SEE NOTE 2		44–015–20258	2
302		MOTOR OPERATOR FOR DISCONNECT SWITCH	S–5224		2
303		SIGNAL POWER SWITCH PLATFORM	S–5231		1
304		SIGNAL POWER TRANSFORMER PLATFORM	S–5231		1
		CATENARY EQUIPMENT			
8	B1	INSULATOR, 10" PORCELAIN		44–770–04402	8
62	ND–1	ADAPTER, CLEVIS TYPE, MALLEABLE IRON, GALVANIZED	ET–449E	44–562–00201	8
81	S	INSULATOR, PIN TYPE	ET1–003	442400111	8
83	S–4	SHACKLE, CHAIN TYPE, FORGED STEEL, GALVANIZED	ET–305E	44–562–27009	12
132		PIN, FOR TYPE–S INSULATOR	ET–288–E4	44–240–0111X	12
147		CARTRIDGE, WHITE, AMPACT# 69338–5		44–423–00607	4
148		CARTRIDGE, RED, AMPACT 69338–2		44–015–00309	4
162		CABLE, #4 AWG, 7 STRAND, HD COPPER PE COVERED		44–045–02355	75'
232		TAP, CABLE WEDGE, #4 TO #4 277060–3		–	2
233		TAP, CABLE WEDGE, 1/0 TO #4 277060–1		–	2
234		CLIP, 3/8" CABLE, BRONZE, BRIDESBURG FOUNDRY WIRE LOCK		44–045–09901	8
235		LUG – FOR 1/0, COMP. TYPE		02–180–03562	4
236		CUTOUT FUSE, ENCLOSED, 7.8KV, 50 AMP		44–950–01600	4
237		LIGHTNING ARRESTOR, 9KV		02–949–50705	4
238		LUG – FOR 2/0, COMP. TYPE			4
269		TAP, 1/0 CU. TO 1/0 CU. AMPACT# 1–275187–8		44–230–02004	4
270		SERVIT POST, #4 AWG TO FLAT, BURNDY KC23, 1/2–13 STUD			4
–		TIE WIRE, #4 AWG, BARE COPPER SOLID SOFT DRAWN		–	40'
–		CONDUCTOR, 1/0 7 STRAND HD COPPER		44–045–00202	25'

NOTES:

1. SECONDARY INSULATED CABLE AND CONDUIT FURNISHED AND INSTALLED BY C&S DEPARTMENT.
2. SWITCH UNITS TO BE SUPPLIED WITH 2 SETS COMPLETE OF OPERATION RODS WITH NECESSARY GUIDES, BEARINGS UNIVERSALS, LOCKING AND MOTOR OPERATOR BY SWITCH MANUFACTURER.
3. SIGNAL POWER CUT SECTIONS IN INTERLOCKINGS SHALL HAVE TWO TRANSFORMERS AND MOTOR OPERATORS FOR REMOTE OR LOCAL OPERATION.

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No	Revisions	Date	By

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
CATENARY DETAILS
TWO TRANSFORMERS, MOTOR OPERATORS

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

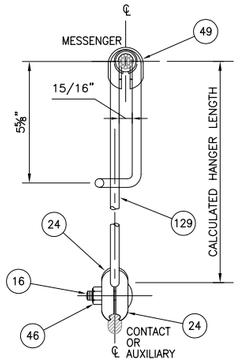
File No.:	2011–059–ET–1811.DWG
Ref. No.:	2011–059
Sheet No:	228 OF 347

ET–1811

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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB-22	BOLT, STAINLESS STEEL	ET-148E	1
24	BC-26B	GROOVE WIRE TO 0.34"ø HANGER ROD, CLIP	ET-1078E	2
49	FHS	MESSENGER SADDLE	ET-652E	1
129	---	0.34"ø LOOP HANGER	ET-1095E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1

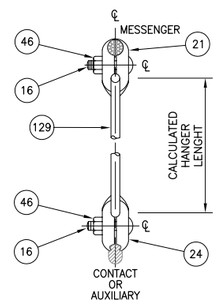
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "ME"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB-22	BOLT, STAINLESS STEEL	ET-148E	2
21	BC-24B	5/8"ø TO 0.34"ø HANGER ROD, CLIP	ET-1087E	2
24	BC-26B	GROOVE WIRE TO 0.34"ø HANGER ROD, CLIP	ET-1078E	2
129	---	0.34"ø HANGER HOOK TYPE	ET-1095E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

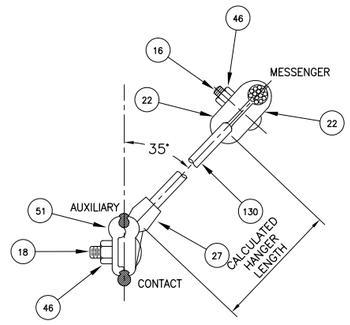
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "J"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	1
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	1
22	BC24C	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1086E	2
27	BC32	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1178E	1
51	HC29A	INTERMEDIATE CATENARY CLIP	ET-1029E	1
130	–	0.42"ø HANGER ROD THR'D & HOOK TYPE	ET-1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

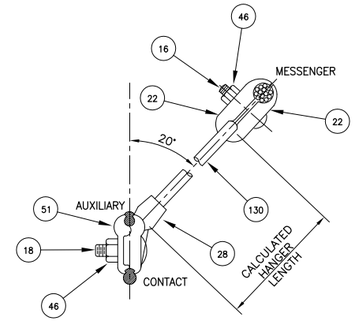
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "C"
FOR HANGERS OVER 3'-0"
FOR CATENARY STANDARD IV

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	1
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	1
22	BC24C	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1086E	2
28	BC33	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1081E	1
51	HC29A	INTERMEDIATE CATENARY CLIP	ET-1029E	1
130	–	0.42"ø HANGER ROD THR'D & HOOK TYPE	ET-1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

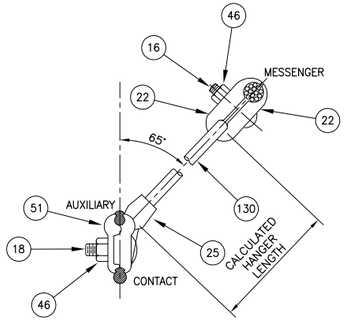
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "D"
FOR HANGERS OVER 3'-0"
FOR CATENARY STANDARD IV

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	1
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	1
22	BC24C	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1086E	2
25	BC30	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1079E	1
51	HC29A	INTERMEDIATE CATENARY CLIP	ET-1029E	1
130	–	0.42"ø HANGER ROD THR'D & HOOK TYPE	ET-1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

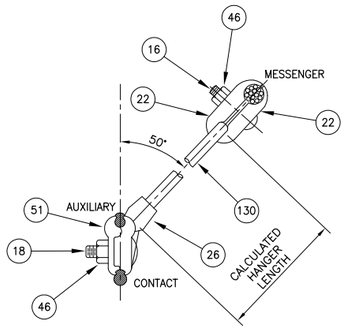
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "A"
FOR HANGERS OVER 3'-0"
FOR CATENARY STANDARD IV

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	1
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	1
22	BC24C	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1086E	2
26	BC31	GROOVE WIRE TO 0.42"ø HANGER ROD, CLIP	ET-1080E	1
51	HC29A	INTERMEDIATE CATENARY CLIP	ET-1029E	1
130	–	0.42"ø HANGER ROD THR'D & HOOK TYPE	ET-1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

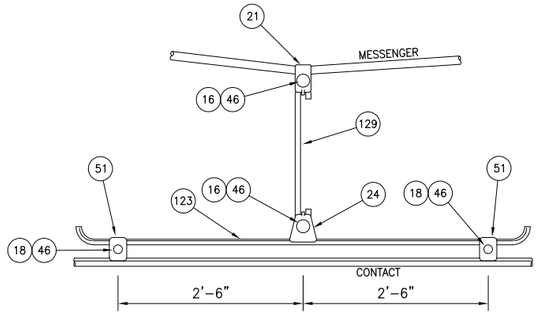
* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "B"
FOR HANGERS OVER 3'-0"
FOR CATENARY STANDARD IV

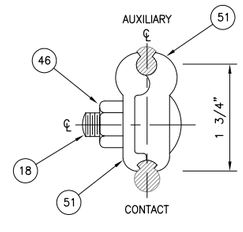
BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	2
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	2
21	BC24B	5/8"ø TO 0.34"ø HANGER ROD, CLIP	ET-1087E	2
24	BC26B	GROOVE WIRE TO 0.34ø HANGER ROD, CLIP	ET-1078E	2
51	HC29A	INTERMEDIATE CATENARY CLIP	ET-1029E	4
123	---	4/O DUMMY, 6'-0" LONG	-----	1
129	---	0.34"ø HANGER HOOK TYPE	ET-1095E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	4

* - FOR LENGTH SEE TABULATION OR CATENARY PROFILES



ASSEMBLY "JD"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB-34	BOLT, STAINLESS STEEL	ET-148E	1
51	HC-29A	INTERMEDIATE CATENARY CLIP	ET-1029E	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1



ASSEMBLY "H"
SCALE: NONE

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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
HANGER ASSEMBLIES, SHEET 1 OF 2

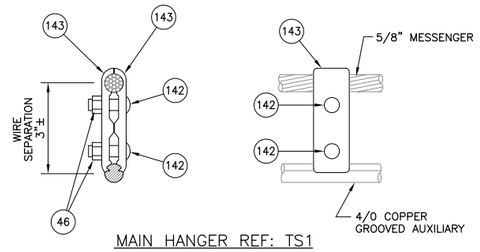
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File No.:	2011-059-ET-1900.DWG
Ref. No.:	2011-059
Sheet No:	229 OF 347

ET-1900

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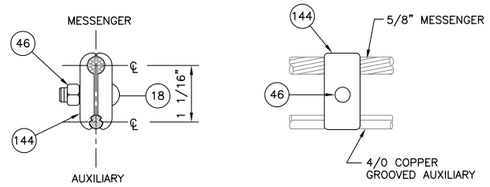
BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
142	BB31	BOLT, CARRIAGE, BRONZE, WITH HEX. NUT,	ET-148-E	2
143	TS1	CLIP, GROOVED WIRE TO 5/8" MESSENGER, BRONZE	ET-76-E	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2



MAIN HANGER REF: TS1

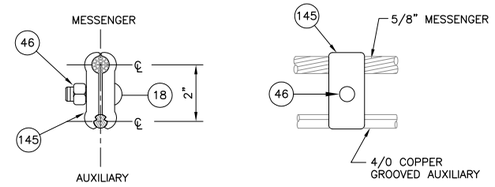
NOTE: THIS CLIP ALLOWS SLIGHT ADJUSTMENT OF THE LOWER WIRE BY ABOUT 1/4"

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB34	BOLT, STAINLESS STEEL	---	1
144	TS22	CLIP, GROOVED WIRE TO 5/8" MESSENGER, BRONZE	ET-90-E	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1



HANGER REF: TS22
N.T.S.

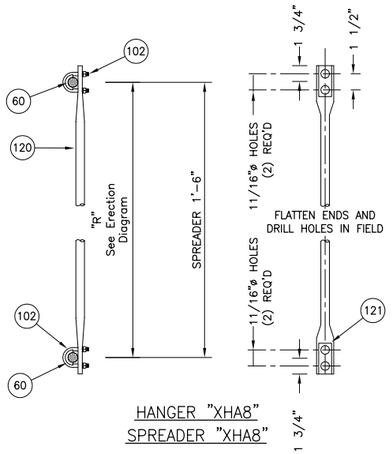
BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB34	BOLT, STAINLESS STEEL	---	1
145	TS25	CLIP, GROOVED WIRE TO 5/8" MESSENGER, BRONZE	ET-170-E	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1



HANGER REF: TS25
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
60	MWS	MESSENGER SADDLE, SWS OR MWS	ET-170E	2
102	UB27	U-BOLT	ET-782E	2
120	–	1.125" O.D. TUBE BRONZE	---	*
121	–	1/4" COPPER FILLER	---	2

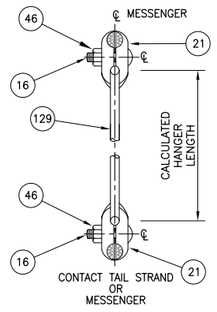
* – FOR LENGTH SEE ERECTION DIAGRAM



HANGER "XHA8"
SPREADER "XHA8"

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET-148E	2
21	BC24B	5/8"ø TO 0.34"ø HANGER ROD	ET-1087E	4
129	–	0.34"ø HANGER HOOK TYPE	ET-1095E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

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ASSEMBLY "K"
SCALE: NONE

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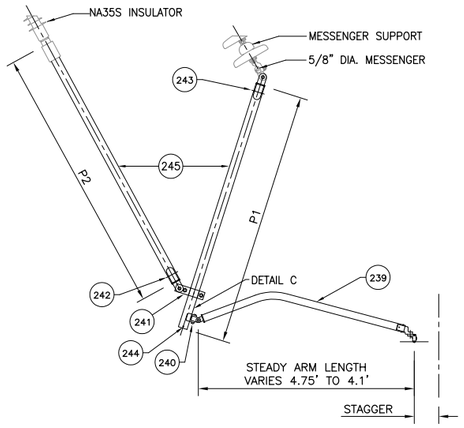
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
HANGER ASSEMBLIES, SHEET 2 OF 2

File No.:	2011-059-ET-1901.DWG
Ref. No.:	2011-059
Sheet No:	230 OF 347

ET-1901

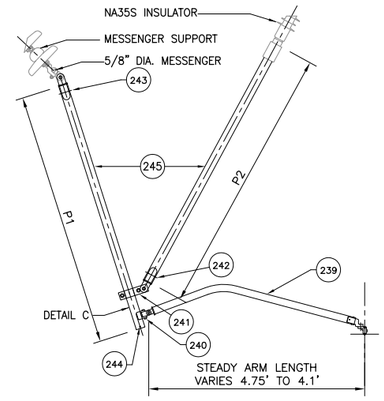
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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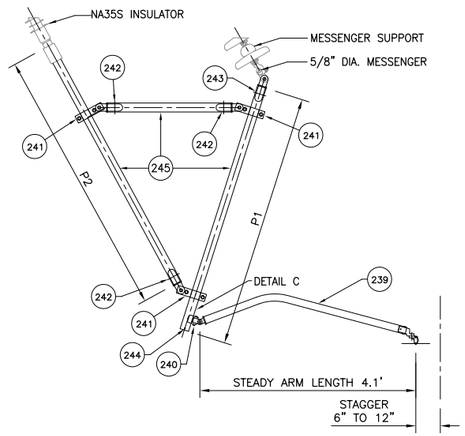
ASSEMBLY P0A70A
SCALE: NONE
3–WIRE SYSTEM

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
239	–	STEADY ARM ALUMINUM WITH CLEVIS END LENGTH VARIES: 4.75', 4.43', 4.1' END FITTING FOR AUX & CW.	SA–FTSA47–01 SA–FTSA43–01 SA–FTSA41–01	1
240	–	CLEVIS PIPE FOR STEADY ARM	B3431–01	1
241	–	CLEVIS CLAMP FOR PIPE	B0408–01	1
242	–	COMPONENT EYE FOR PIPE, SCH 80	B0505–01	1
243	–	COMPONENT CLEVIS FOR PIPE, SCH 80	B0505–03	1
244	–	COTTER PIN, STN STEEL, 3/16" DIA X 1"	---	1
245	–	PIPE, 2" NOM. DIA, ALUMINUM, SCH 80	---	A/R



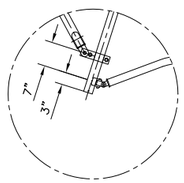
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SCALE: NONE
3–WIRE SYSTEM

BILL OF MATERIALS				
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240	–	CLEVIS PIPE FOR STEADY ARM	B3431–01	1
241	–	CLEVIS CLAMP FOR PIPE	B0408–01	1
242	–	COMPONENT EYE FOR PIPE, SCH 80	B0505–01	1
243	–	COMPONENT CLEVIS FOR PIPE, SCH 80	B0505–03	1
244	–	COTTER PIN, STN STEEL, 3/16" DIA X 1"	---	1
245	–	PIPE, 2" NOM. DIA, ALUMINUM, SCH 80	---	A/R



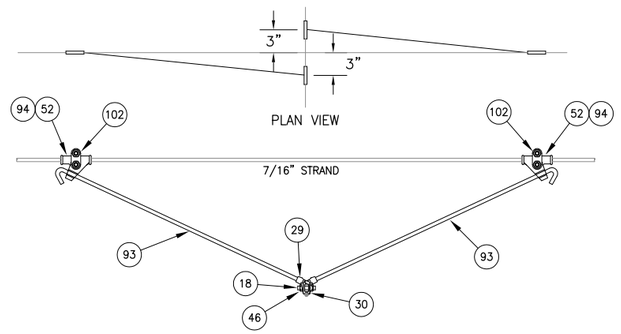
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3–WIRE SYSTEM

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
239	–	STEADY ARM ALUMINUM WITH CLEVIS END LENGTH VARIES: 4.75', 4.43', 4.1' END FITTING FOR AUX & CW.	SA–FTSA47–01 SA–FTSA43–01 SA–FTSA41–01	1
240	–	CLEVIS PIPE FOR STEADY ARM	B3431–01	1
241	–	CLEVIS CLAMP FOR PIPE	B0408–01	3
242	–	COMPONENT EYE FOR PIPE, SCH 80	B0505–01	3
243	–	COMPONENT CLEVIS FOR PIPE, SCH 80	B0505–03	1
244	–	COTTER PIN, STN STEEL, 3/16" DIA X 1"	---	1
245	–	PIPE, 2" NOM. DIA, ALUMINUM, SCH 80	---	A/R



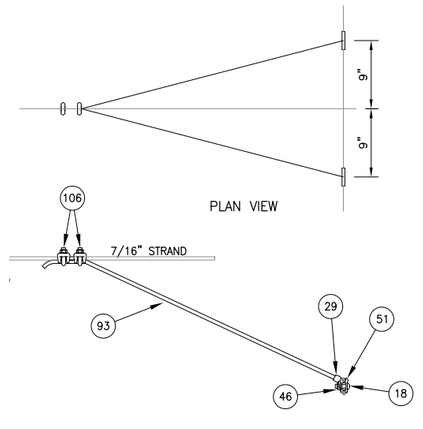
DETAIL "C"
SCALE: NONE

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB–34	BOLT, STAINLESS STEEL	ET–148E	2
29	BC–34	HORIZONTAL STEADY CLIP	ET–1089E	2
30	BC–37	FACING CLIP	ET–1083E	2
52	HSC	CLAMP	ET–918E	2
93	SR	0.48"ø BRONZE ROD	ET–1095E	2
94	SWS	7/16" SADDLE	ET–170E	2
102	UB–27	U–BOLT	ET–145E24	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	2



ASSEMBLY "SA50a"
SCALE: NONE

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB–34	BOLT, STAINLESS STEEL	ET–148E	2
29	BC–34	HORIZONTAL STEADY CLIP	ET–1089E	2
51	HC29A	INTERMEDIATE CLIP	ET–1029E	2
93	SR	0.48"ø BRONZE ROD	ET–1095E	2
106	WL3	7/16" WIRE CLIP	ET–556E	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	2



ASSEMBLY "SA51a"
SCALE: NONE

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No	Revisions	Date	By

AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
REGISTRATION ASSEMBLIES

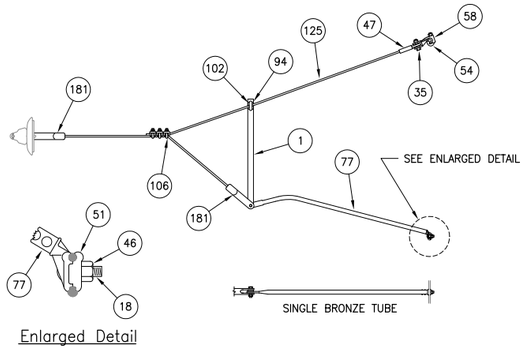
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File No.:	2011–059–ET–1902.DWG
Ref. No.:	2011–059
Sheet No:	231 OF 347

ET–1902

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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
1	1130A	STRAP	ET-1130E	1
18	SSB-34	BOLT, STAINLESS STEEL	ET-148E	1
35	BG-2	BOLT	ET-145E	1
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	1
51	HC-29A	INTERMAEDIATE CLIP	ET-1029E	1
54	JB	J-BOLT	ET-148E	2
58	MK-1	MESSENGER HOOK	ET-1146D	1
77	PO-3	PULL OFF ARM	14B-63	1
94	SWS	SADDLE, 7/16" SWS	ET-170E	1
96	TH-3	THIMBLE	11B-1234	1
102	UB-27	U-BOLT	ET-145E	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	3
125	–	7/16" COPPERWELD STRAND	-----	1
181	CS7/16	FORKED COLLAR SOCKET, FOR 7/16"	-----	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1

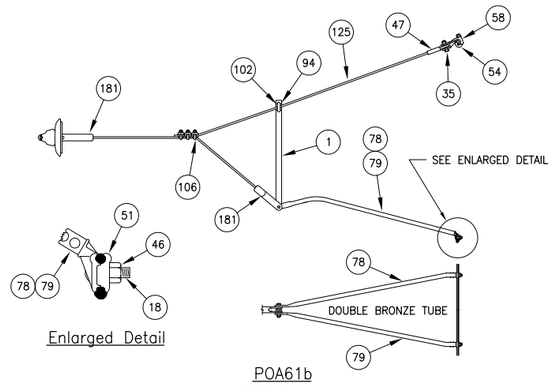


Enlarged Detail

P0A61a

HORIZ. STRAND PULL OFF ASS'Y

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
1	1130A	STRAP	ET-1130E	1
18	SSB34	BOLT, STAINLESS STEEL	ET-148E	2
35	BG2	BOLT	ET-145E	1
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	1
51	HC29A	INTERMEDIATE CLIP	ET-1029E	2
54	JB	J-BOLT	ET-148E	2
58	MK1	MESSENGER HOOK	ET-1146D	1
78	POL4	PULL OFF ARM	14B-63	1
79	POR4	PULL OFF ARM	14B-63	1
94	SWS	SADDLE, 7/16" SWS	ET-170E	1
96	TH3	THIMBLE	11B-1234	1
102	UB27	U-BOLT	ET-145E	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	3
125	–	7/16" COPPERWELD STRAND	-----	1
181	CS7/16	FORKED COLLAR SOCKET, FOR 7/16"	-----	2
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

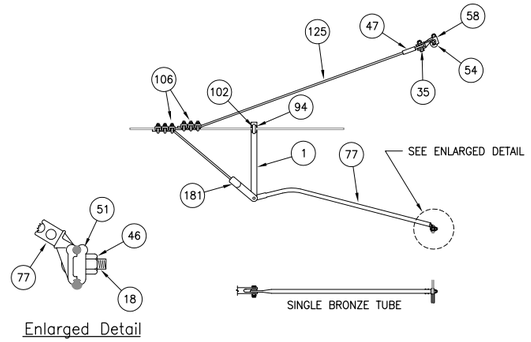


Enlarged Detail

P0A61b

HORIZ. STRAND PULL OFF ASS'Y

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
1	1130A	STRAP	ET-1130E	1
18	SSB-34	BOLT, STAINLESS STEEL	ET-148E	1
35	BG-2	BOLT	ET-145E	1
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	1
51	HC-29A	INTERMEDIATE CLIP	ET-1029E	1
54	JB	J-BOLT	ET-148E	2
58	MK-1	MESSENGER HOOK	ET-1146D	1
77	PO-3	PULL OFF ARM	14B-63	1
94	SWS	SADDLE, 5/8" MWS OR 7/16" SWS	ET-170E	1
102	UB-27	U-BOLT	ET-145E	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	6
125	–	7/16" COPPERWELD STRAND	-----	1
181	CS7/16	FORKED COLLAR SOCKET, FOR 7/16"	-----	1
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	1

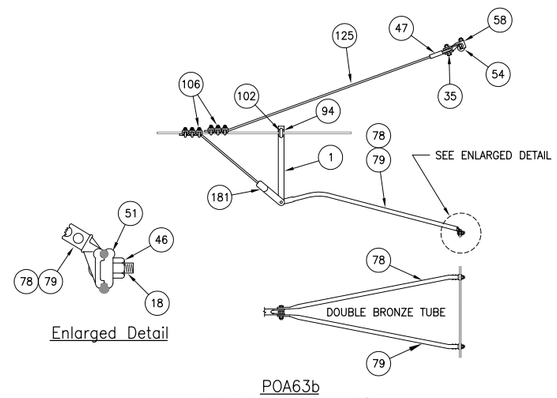


Enlarged Detail

P0A63a

HORIZ. STRAND PULL OFF ASS'Y

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
1	1130A	STRAP	ET-1130E	1
18	SSB-34	BOLT, STAINLESS STEEL	ET-148E	2
35	BG-2	BOLT	ET-145E	1
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	1
51	HC-29A	INTERMEDIATE CLIP	ET-1029E	2
54	JB	J-BOLT	ET-148E	2
58	MK-1	MESSENGER HOOK	ET-1146D	1
78	POL4	PULL OFF ARM	14B-63	1
79	POR4	PULL OFF ARM	14B-63	1
94	SWS	SADDLE, 7/16" SWS	ET-170E	1
102	UB-27	U-BOLT	ET-145E	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	6
125	–	7/16" COPPERWELD STRAND	-----	1
181	CS7/16	FORKED COLLAR SOCKET, FOR 7/16"	-----	1
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF-LOCKING WASHER, 316 SS W/ ANTI-GALLING	ET1-100	2

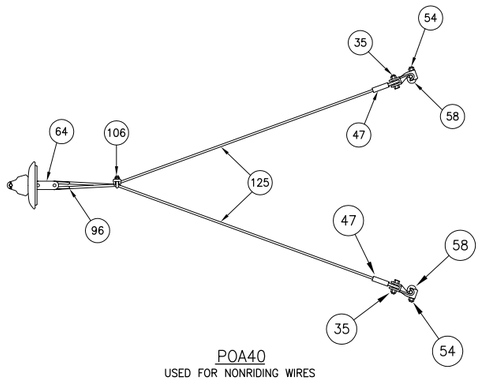


Enlarged Detail

P0A63b

HORIZ. STRAND PULL OFF ASS'Y

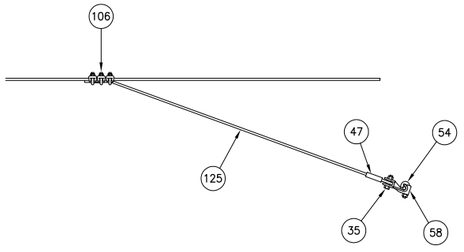
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
35	BG2	BOLT	ET-145E	2
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	2
54	JB	J-BOLT	ET-148E	4
58	MK1	MESSENGER HOOK	ET-1146D	2
64	ND4	CLEVIS ADAPTER	ET-394E	1
96	TH3	THIMBLE	11B-1234	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	1
125	–	7/16" COPPERWELD STRAND	-----	AS REQ'D



P0A40

USED FOR NONRIDING WIRES

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
35	BG2	BOLT	ET-145E	1
47	ES7/16	EYELET COLLAR SOCKET FOR 7/16"	-----	1
54	JB	J-BOLT	ET-148E	2
58	MK1	MESSENGER HOOK	ET-1146D	1
106	WL3	WIRE CLIP, 7/16"	ET-556E	3
125	--	7/16" COPPERWELD STRAND	-----	AS REQ'D

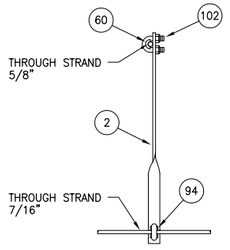


P0A41

USED FOR NONRIDING WIRES

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
2	1130B	STRAP	ET-1130E	1
60	MWS	SADDLE FOR 5/8 THROUGH WIRE	ET-170E	1
94	SWS	SADDLE FOR 7/16 THROUGH WIRE	ET-170E	1
102	UB-27	U-BOLT	ET-145E	2

FOR 5/8" STRAND USE MWS, AND FOR 7/16" STRAND USE SWS

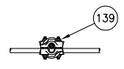


P0HA

SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
139	--	CLAMP, CROSS, WIRE FOR 7/16" STRAND	------	1

USE ON 7/16" ø STRAND



SA55a

SCALE: NONE

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No	Revisions	Date	By

AMTRAK

OFFICE OF
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Engineering

National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

Approved	Date

Burns

BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker

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PULL-OFF ASSEMBLIES

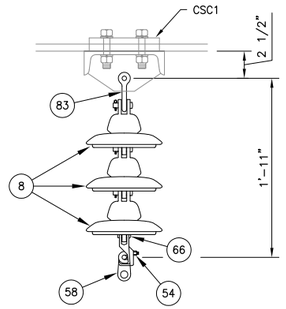
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Ref. No.:	2011-059
Sheet No:	232 OF 347

ET-1903

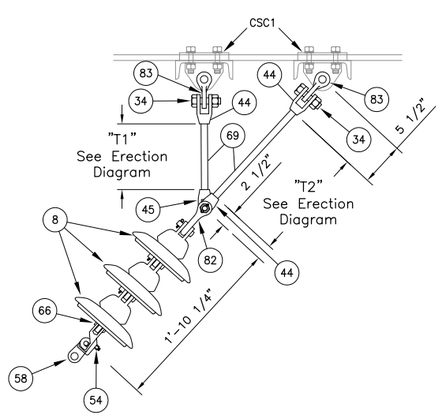
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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
54	JB	J–BOLT	ET–148E	2
58	MK1	MESSENGER HOOK	ET–1146D	1
66	NP1	PIN WITH COTTER, 5/8"ø	11B–1206	1
83	S4	SHACKLE	ET–305	1



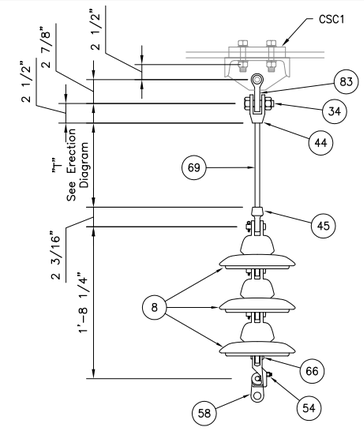
1 ET–1904 INSULATOR ASSEMBLY "NA29"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
34	BG–1	BOLT	ET–145E	2
44	CE–1	CLEVIS END	11B–1227	3
45	EE–1	EYE END	11B–1227	1
54	JB	J–BOLT	ET–148E	2
58	MK–1	MESSENGER HOOK	ET–1146D	1
66	NP–1	PIN WITH COTTER, 5/8"ø	11B–1206	1
69	NR–2	HANGER ROD, 0.72"ø ROD	14E–433	2
82	S–2	SHACKLE WITH BOLT	ET–305	1
83	S–4	SHACKLE WITH BOLT	ET–305	2



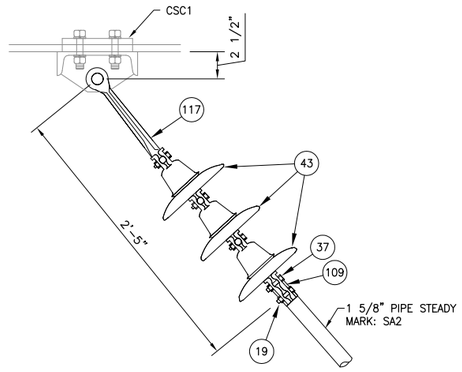
2 ET–1904 INSULATOR ASSEMBLY "NA27A"
N.T.S.

BILL OF MATERIAL					
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	NA83 QTY	NA83X QTY
8	B1	INSULATOR	ET1–003	3	–
34	BG–1	3/4" BOLT WITH COTTER	ET–145E	1	1
44	CE–1	CLEVIS END	11B–1227	1	1
45	EE–1	EYE END	11B–1227	1	1
54	JB	J–BOLT	ET–148E	2	2
58	MK–1	MESSENGER HOOK	ET–1146D	1	1
66	NP–1	PIN WITH COTTER, 5/8"ø	11B–1206	1	1
69	NR–2	HANGER ROD, 0.72"ø	14E–433	1	1
83	S–4	SHACKLE & BOLT	ET–305	1	1



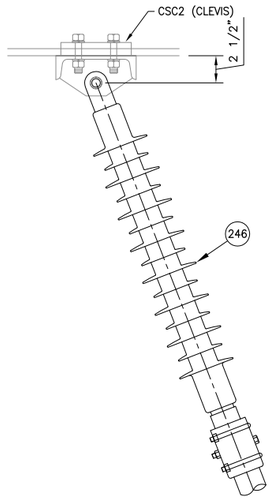
3 ET–1904 INSULATOR ASSEMBLY "NA83 & NA83X"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
19	BB55	BOLT	ET–516E	1
37	BG29	BOLT	ET–145E	1
43	C	INSULATOR	ET1–003	3
109	XC5	PIPE CLAMP	11B–1231	1
117	XT17	RIGID INSULATOR STRAP WITH PIN	ET–907E	1



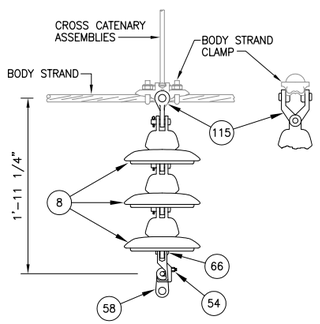
4 ET–1904 INSULATOR ASSEMBLY "NA35"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
246	–	SYNTHETIC PIPE INSULATOR, 2" DIA PIPE SEDIVER INC REF # TU80XG015	B0407–01	1



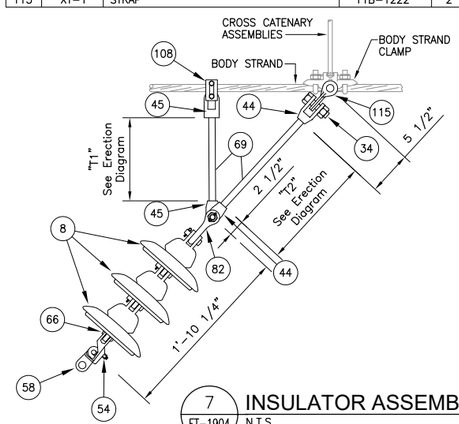
5 ET–1904 INSULATOR ASSEMBLY "NA35S"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
54	JB	J–BOLT	ET–148E	2
58	MK–1	MESSENGER HOOK	ET–1146D	1
66	NP–1	PIN WITH COTTER, 5/8"ø	11B–1206	1
115	XT–1	STRAP	11B–1222	2



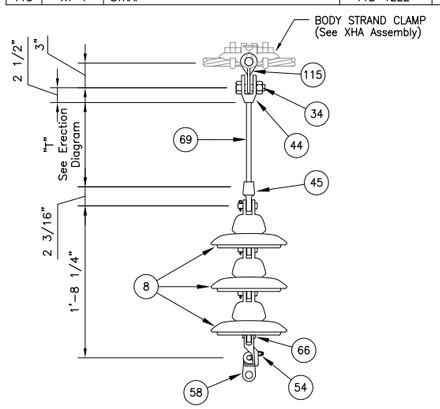
6 ET–1904 INSULATOR ASSEMBLY "NA20"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
34	BG–1	BOLT	ET–145E	1
44	CE–1	CLEVIS END	11B–1227	2
45	EE–1	EYE END	11B–1227	2
54	JB	J–BOLT	ET–148E	2
58	MK–1	MESSENGER HOOK	ET–1146D	1
66	NP–1	PIN WITH COTTER, 5/8"ø	11B–1206	1
69	NR–2	HANGER ROD, 0.72"ø ROD	14E–433	2
82	S–2	SHACKLE WITH BOLT	ET–305	1
108	WL5	3/4" WIRE CLIP	ET–556E	1
115	XT–1	STRAP	11B–1222	2



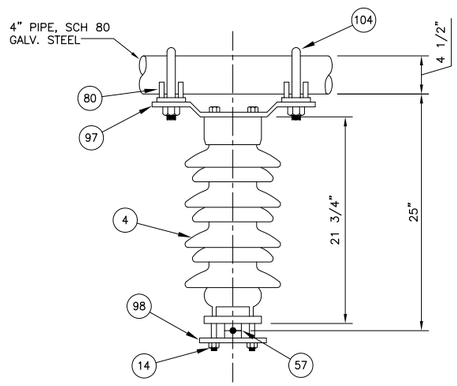
7 ET–1904 INSULATOR ASSEMBLY "NA24A"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
34	BG–1	3/4" BOLT WITH COTTER	ET–145E	1
44	CE–1	CLEVIS END	11B–1227	1
45	EE–1	EYE END	11B–1227	1
54	JB	J–BOLT	ET–148E	2
58	MK–1	MESSENGER HOOK	ET–1146D	1
66	NP–1	PIN WITH COTTER, 5/8"ø	11B–1206	1
69	NR–2	HANGER ROD, 0.72"ø	14E–433	1
115	XT–1	STRAP	11B–1222	2



8 ET–1904 INSULATOR ASSEMBLY "NA82"
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
4	3T	RIGID INSULATOR	ET1–003	1
14	BB7	5/8" BRONZE BOLT W/ LOCKWASHER	ET–148E	2
57	MD5	MESSENGER SADDLE	ET–1124E	2
80	PS1A	PIPE SADDLE	14E–133	2
97	TP1	BENT PLATE	ET–1183E	1
98	TP2	BENT PLATE	ET–1183E	1
104	UB60	U–BOLT	-----	2



9 ET–1904 INSULATOR ASSEMBLY "1122A"
N.T.S.

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Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
MESSENGER SUPPORT ASSEMBLIES

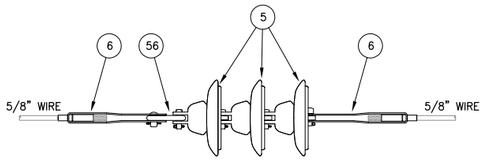
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

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ET–1904

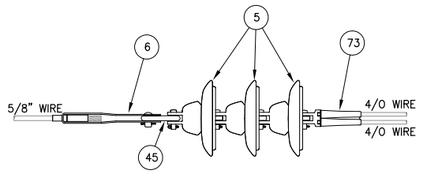
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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	3
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	2
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1



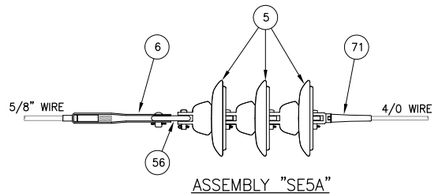
ASSEMBLY "SE1A"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	3
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	1
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1
73	OB22307	DOUBLE, 4/0 & 4/0 CLAMP, CLEVIS	-----	1



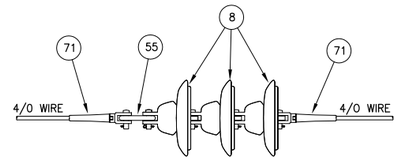
ASSEMBLY "SE12A"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	3
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	1
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1
71	OB-20720	TROLLEY DEAD END CLAMP, CLEVIS	-----	1



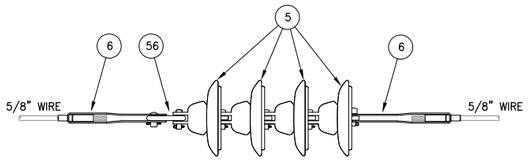
ASSEMBLY "SE5A"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1-003	3
55	LK2	5/8" CHAIN LINK, CROSBY	-----	1
71	OB20720	TROLLEY DEAD END CLAMP, CLEVIS	-----	2



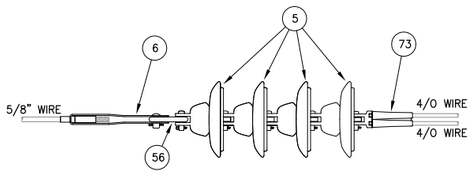
ASSEMBLY "SE9A"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	4
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	2
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1



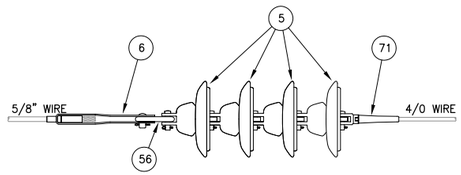
ASSEMBLY "SE1B"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	4
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	1
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1
73	OB22307	DOUBLE, 4/0 & 4/0 CLAMP, CLEVIS	-----	1



ASSEMBLY "SE12B"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
5	A2	INSULATOR	ET1-003	4
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	1
56	LK3	3/4" CHAIN LINK, CROSBY	-----	1
71	OB-20720	TROLLEY DEAD END CLAMP, CLEVIS	-----	1



ASSEMBLY "SE5B"
SCALE: NONE

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No	Revisions	Date	By

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OFFICE OF
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National Railroad Passenger Corporation
30TH Street Station-Philadelphia, Pennsylvania 19104

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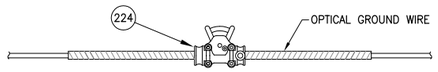
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
DEADEND INSULATOR ASSEMBLIES

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

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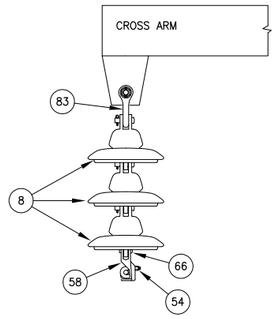
ET-1905

BILL OF MATERIAL			
ITEM	MARK	DESCRIPTION	QTY
224	–	FIBERLIGN CUSHION CLAMP W/ Y–CLEVIS, 4700113	1



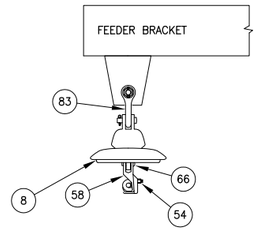
OPS1
FIBER OPTIC SUPPORT

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
54	JB	J–BOLT	ET–148E	2
58	MK1	MESSENGER HOOK	ET–1146D	1
66	NP1	PIN WITH COTTER, 5/8"ø	11B–1206	1
83	S4	SHACKLE WITH BOLT	ET–305	1



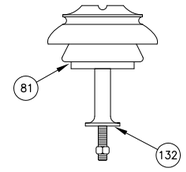
NA16
FEEDER INSULATOR ASSEMBLY

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	1
54	JB	J–BOLT	ET–148E	2
58	MK1	MESSENGER HOOK	ET–1146D	1
66	NP1	PIN WITH COTTER, 5/8"ø	11B–1206	1
83	S4	SHACKLE WITH BOLT	ET–305	1

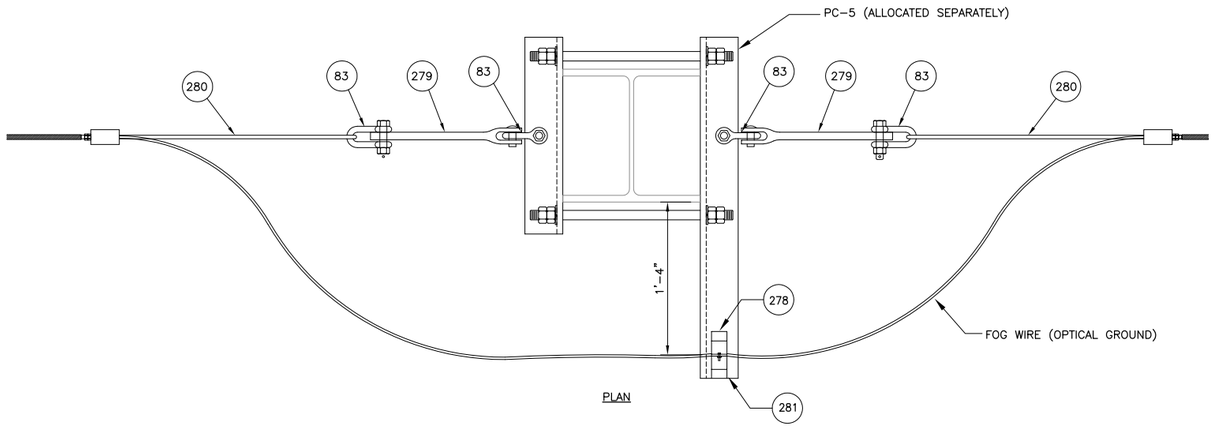


NA74
RAIL RETURN INSULATOR ASSEMBLY

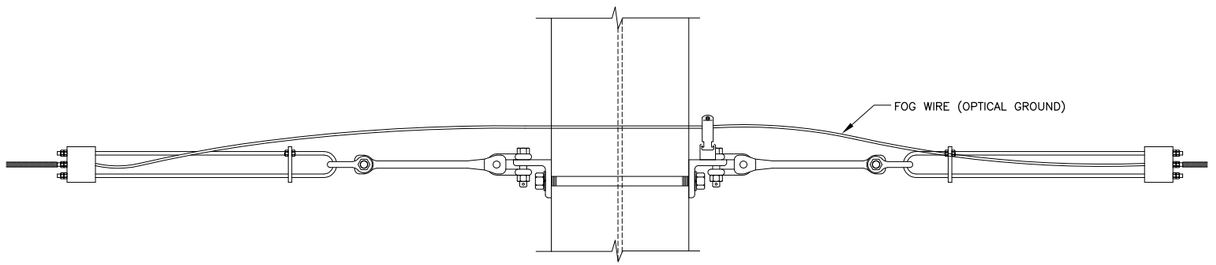
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
81	S	INSULATOR, OHIO BRASS–#38246	ET1–003	1
132	–	PIN FOR "S" INSULTOR, W/ 3/4 NUT	ET–288	1



NA11
SIGNAL INSULATOR ASSEMBLY
CATENARY BRIDGE



PLAN



ELEVATION

OPDE
FOG DEADEND
1½"=1'–0"

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	REF. DWG.	QUANTITY
83	S4	SHACKLE	ET–305	4
278	–	UNI–STRUT SPOOL, HDG		2
279		EXTENSION LINK		2
280		FIBERLIGN DEAD–END		2
281	–	UNI–STRUT P1100, 1 5/8" x 1 5/8", HDG		1'–0"

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30TH Street Station–Philadelphia, Pennsylvania 19104

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ELECTRIFICATION
CATENARY DETAILS
UTILITY WIRE ASSEMBLIES

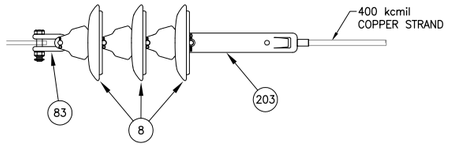
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ET–1906

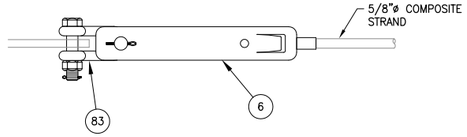
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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
83	S–4	SHACKLE	ET–305E	1
203	CS400	FORKED COLLAR SOCKET, FOR 400 kcmil	-----	1



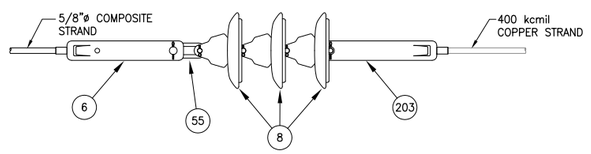
1 ET–1907 **ASSEMBLY "FD1"** N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	6.3225	1
83	S–4	SHACKLE	ET–305E	1



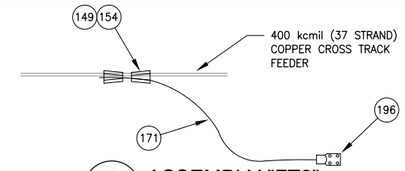
2 ET–1907 **ASSEMBLY "FD9"** N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
6	CS5/8	FORKED COLLAR SOCKET, 610.047.000	-----	1
8	B1	INSULATOR	ET1–003	3
55	LK2	5/8" CHIAN LINK, CROSBY	-----	1
203	CS400	FORKED COLLAR SOCKET, FOR 400 kcmil	-----	1



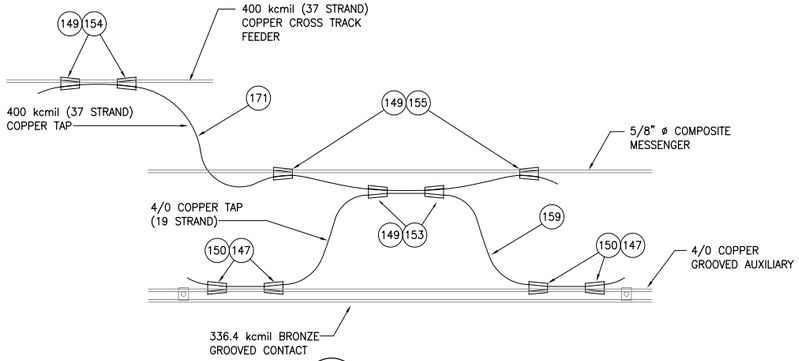
3 ET–1907 **ASSEMBLY "FS9"** N.T.S.

BILL OF MATERIALS			
ITEM	DESCRIPTION	AMP NO.	QUANTITY
149	CARTRIDGE, BLUE (FOR INSTALLATION), 69338–1		4
154	TAP, CABLE WEDGE, 400 kcmil TO 400 kcmil, 3–276337–0		2
171	WIRE, 400 kcmil COPPER, 37 STRAND HD		10 ft
196	SWITCH LUG, 400 kcmil NEMA 4, BURNDY YA322N		1



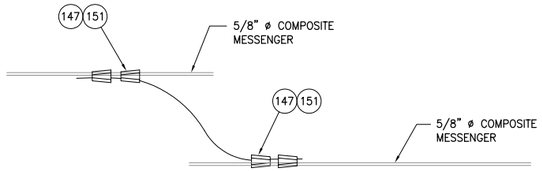
4 ET–1907 **ASSEMBLY "FT2"** N.T.S.

BILL OF MATERIALS			
ITEM	DESCRIPTION	AMP NO.	QUANTITY
147	CARTRIDGE, WHITE (FOR INSTALLATION)	69338–5	4
149	CARTRIDGE, BLUE (FOR INSTALLATION)	69338–1	6
150	TAP, CABLE WEDGE, 4/0 TO 4/0 GROOVE	275187–7	4
153	TAP, CABLE WEDGE, 400 kcmil TO 4/0	3–276337–4	2
154	TAP, CABLE WEDGE, 400 kcmil TO 400 kcmil	3–276337–0	2
155	TAP, CABLE WEDGE, 400 kcmil TO 5/8" DIA.	3–276337–3	2
159	WIRE, 4/0 AWG COPPER, 19 STRAND HD. 112–C		10 ft
171	WIRE, 400 kcmil COPPER, 37 STRAND HD.		20 ft



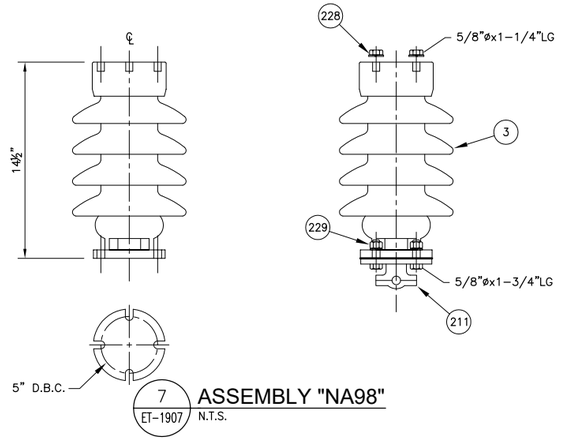
5 ET–1907 **ASSEMBLY "FT1"** N.T.S.

BILL OF MATERIALS			
ITEM	DESCRIPTION	AMP NO.	QUANTITY
147	CARTRIDGE, WHITE (FOR INSTALLATION)	69338–5	4
151	AMP TAP, CU, 5/8 MESS. COMPOSITE TO 4/0 19 STRND CU.	275187–1	4



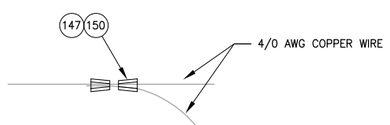
6 ET–1907 **CONTINUITY JUMPER "CJ1"** N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
3	2T	PORCELAIN INSULATOR 5" D.B.C.	ET1–003	1
211	–	BUS SUPPORT, BRZ, 400 MCM, 5" D.B.C.	–	1
228	–	5/8"–11 + 1 1/4" HEX BOLT & WASHERS	–	4
229	–	5/8"–11 + 1 3/4" HEX BOLT, NUT & WASHERS	–	4



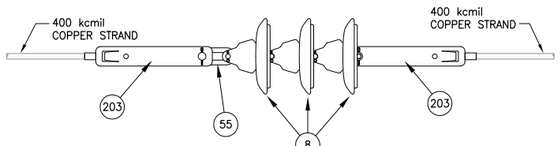
7 ET–1907 **ASSEMBLY "NA98"** N.T.S.

BILL OF MATERIALS			
ITEM	DESCRIPTION	AMP NO.	QUANTITY
147	CARTRIDGE, WHITE (FOR INSTALLATION)	69338–5	2
150	AMP TAP, CU, 4/0 TO 4/0 19 STRND CU.	275187–7	2



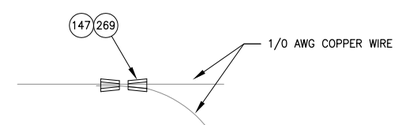
8 ET–1907 **ASSEMBLY "FT3"** N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
55	LK2	5/8" CHIAN LINK, CROSBY	-----	1
203	CS400	FORKED COLLAR SOCKET, FOR 400 kcmil	----	2



9 ET–1907 **ASSEMBLY "FS13"** N.T.S.

BILL OF MATERIALS			
ITEM	DESCRIPTION	AMP NO.	QUANTITY
147	CARTRIDGE, WHITE (FOR INSTALLATION)	69338–5	2
269	AMP TAP, CU, 1/0 TO 1/0 19 STRND CU.	275187–8	2



10 ET–1907 **ASSEMBLY "FT4"** N.T.S.

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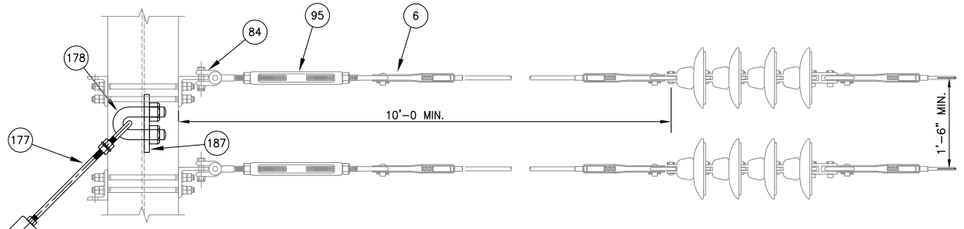
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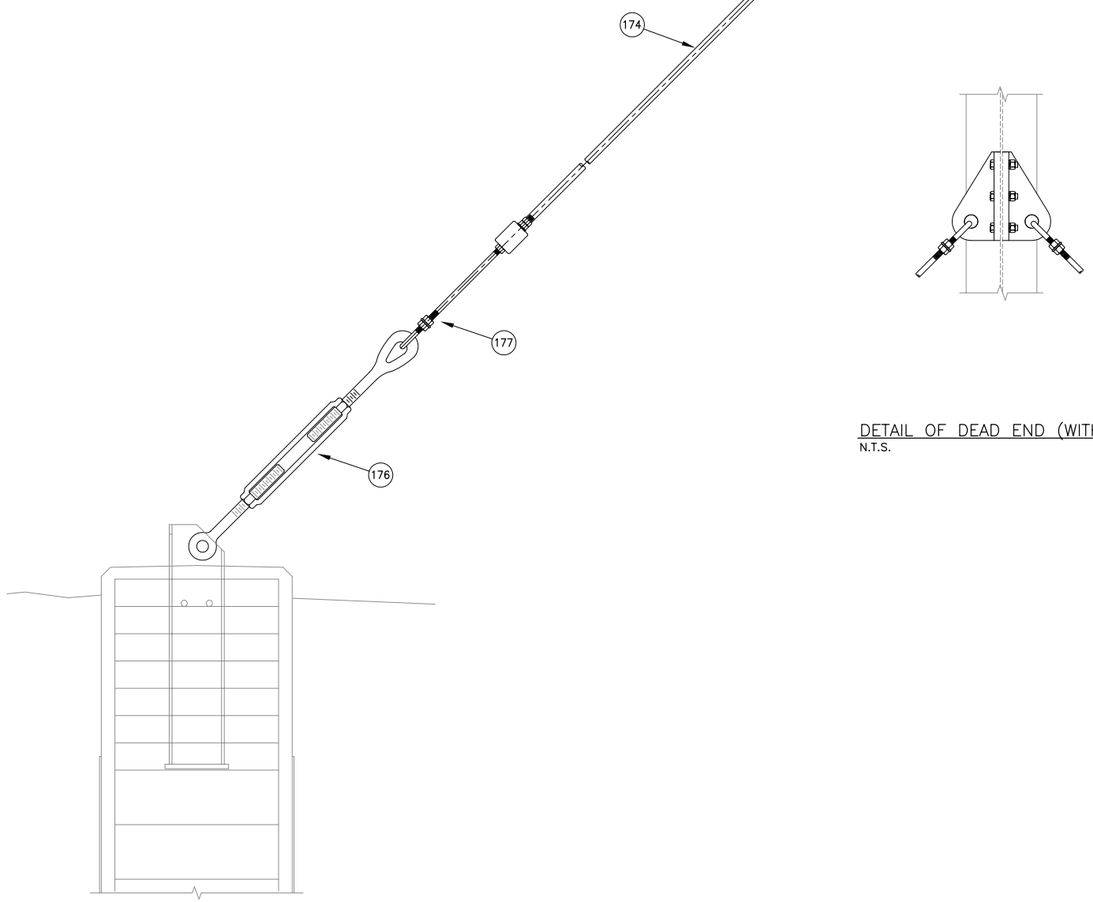
ET–1907

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BILL OF MATERIAL					
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	DG	DG1
6	CS5/8	FORKED COLLAR SOCKET, 610.047.00	-----		2
84	S-20	SHACKLE	-----		2
95	TB18A	TURNBUCKLE	ET-308-D		2
174	---	1" EHS GUY WIRE, GALV STEEL	-----	AS REQ'D	AS REQ'D
176	---	TURNBUCKLE 1-3/4" x 24" CLEVIS - EYE	-----	1	1
177	VG2	VARI-GRIP DEAD END (VG-0-2105)	-----	2	2
178	UB-36	U-BOLT, GALV STEEL, 2"ø	ET-145-E	1	1
187	BP-1	BACKING PLATE (FABRICATE)	-----	1	1
	DGB2	DOWNGUY BRACKET (S-5230)	-----		



DEAD END DETAILS (DG & DG1)
N.T.S.



DETAIL OF DEAD END (WITH DGB2)
N.T.S.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
CATENARY DETAILS
DOWN GUY DETAILS

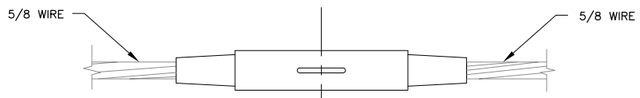
File No.:	2011-059-ET-1908.DWG
Ref. No.:	2011-059
Sheet No:	237 OF 347

ET-1908

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

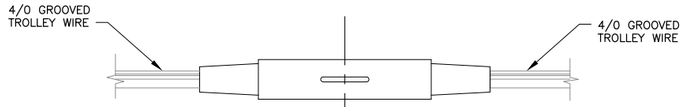
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BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	REF. DWG.	QTY
209	CC5/8	CONICAL SPLICE, FOR 5/8" CAT. MESS. WIRE, ARTHUR FLURY, 615.006.106	----	1



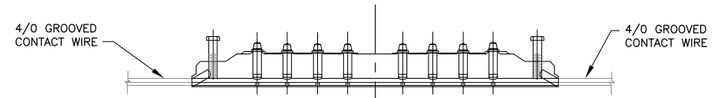
1 ET-1909 CONICAL SPLICE "CC5/8"
N.T.S.

BILL OF MATERIALS AUXILIARY SPLICE				
ITEM	MARK	DESCRIPTION	REF. DWG.	QTY
207	CC4/0T	CONICAL SPLICE, FOR 4/0 BRNZ OR CU. TROLLEY, ARTHUR FLURY, 615.233.000	----	1



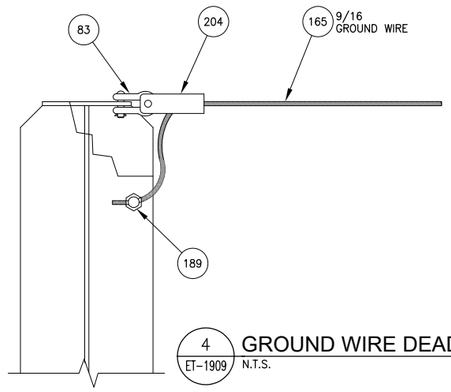
2 ET-1909 CONICAL SPLICE "CC4/0T"
N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	REF. DWG.	QTY
92	SPL3	SPLICE FOR 4/0 GROOVED CONTACT WIRE	----	1



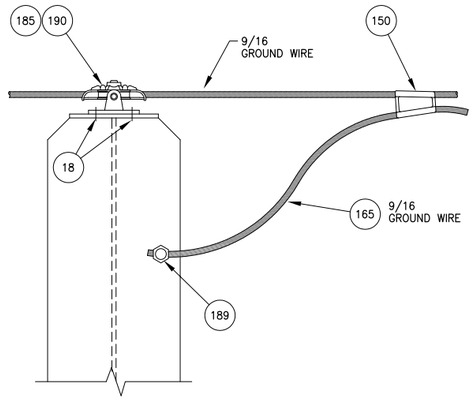
3 ET-1909 TROLLEY SPLICE "SPL3"
N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	UNITS	QTY
83	S4	SHACKLE, GALV STEEL	EA	1
165	--	9/16 CONDUCTOR	FT	3
189	--	SERVIT POST, BRONZE BURNDY KC31B1	EA	1
204	--	FORKED COLLAR SOCKET, ARTHUR FLURY NO. 610.090.000	EA	1



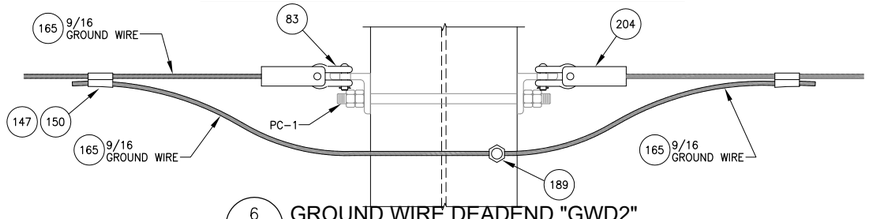
4 ET-1909 GROUND WIRE DEADEND "GWD1"
N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	UNITS	QTY
18	SSB34	BOLT, STAINLESS STEEL 1/2"x1 5/8" W/ NUT AND LOCKWASHER	EA	2
150	--	WIRE TO WIRE TAP, COPPER AMP NO. 2-275187-8	EA	1
165	--	9/16 CONDUCTOR	FT	3
185	--	CLAMP TOP BRACKET, MALLEABLE IRON, GALV. LAPP 57111	EA	1
189	--	SERVIT POST, BRONZE BURNDY KC31B1	EA	1
190	--	CLAMP TOP BRACKET, MALLEABLE IRON, GALV. LAPP 47102	EA	2



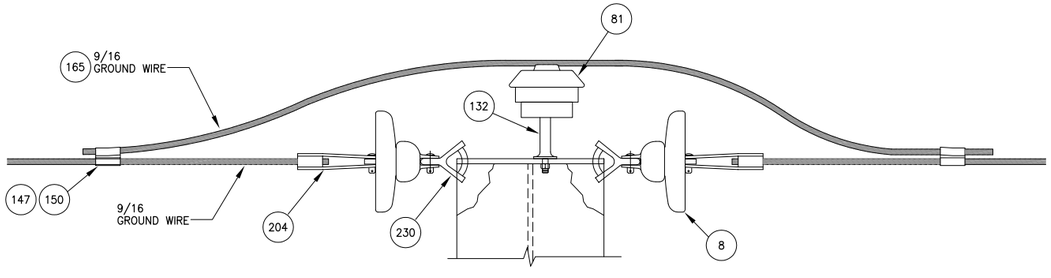
5 ET-1909 GROUND WIRE SUPPORT "GWS1"
N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	UNITS	QTY
83	S4	SHACKLE WITH BOLT	EA	2
150	--	WIRE TO WIRE TAP, COPPER AMP NO. 2-275187-8	EA	2
147	--	AMPACT WHITE CARTRIDGE 693385	EA	2
165	--	9/16 CONDUCTOR	FT	6
204	--	FORKED COLLAR SOCKET, ARTHUR FLURY NO. 610.090.000	EA	2
189	--	SERVIT POST, BRONZE BURNDY KC31B1	EA	1



6 ET-1909 GROUND WIRE DEADEND "GWD2"
N.T.S.

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	UNITS	QTY
8	B1	INSULATOR	EA	2
81	--	TYPE S INSULATOR	EA	1
132	--	PIN FOR TPE "S" INSULATOR W/ 3/4" NUT	EA	1
147	--	AMPACT WHITE CARTRIDGE 693385	EA	2
150	--	WIRE TO WIRE TAP, COPPER AMP NO. 2-275187-8	EA	2
165	--	9/16 CONDUCTOR	FT	6
204	--	FORKED COLLAR SOCKET, ARTHUR FLURY NO. 610.090.000	EA	2
230	--	Y CLEVIS EYE, GALV. HUBBELL YCC3090	EA	2



7 ET-1909 GROUND WIRE DEADEND "GWS2"
N.T.S.

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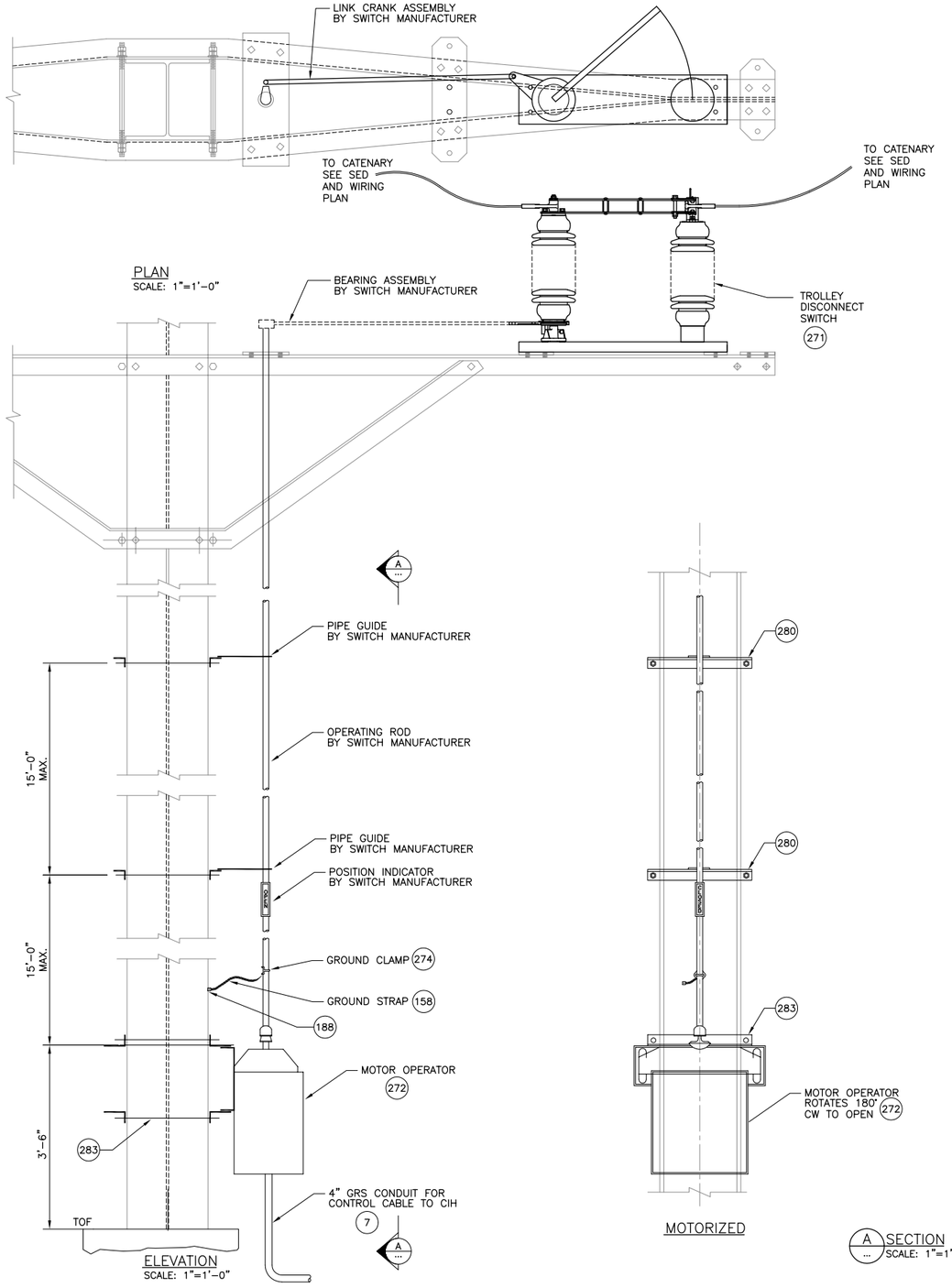
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
GROUNDING AND SPLICE ASSEMBLIES

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1909.DWG
Ref. No.:	2011-059
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ET-1909

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BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	AMTRAK REF. DRAWING	QTY.
158		2/0 AWG GROUND WIRE	1275187-5	VARIES
188		SERVIT POST CONNECTOR BURNDY KC28B1	–	1
271	SW	DISCONNECT SWITCH, 34.5 kV, 1200 AMP. SPST WITH OPERATING PIPES, COUPLINGS, LINKS, BEARINGS AND GUIDES	ET-1919	1
272	MOD	MOTOR OPERATOR FOR DISCONNECT SWITCH		1
273	HAN	HAND OPERATOR FOR DISCONNECT SWITCH		1
274	–	GROUND CLAMP FOR 1 1/2" DIA PIPE. BURNDY GAR-1629		1
280	RS14	ROD SUPPORT	S-5225	*
282	HO14	HAND OPERATOR SUPPORT	S-5225	1
283	MOS14	MOTOR OPERATOR SUPPORT	S-5225	1
286	–	4" RGS CONDUIT	–	VARIES

NOTES:
1. INSTALL ROD SUPPORTS AT 15'-0" MAXIMUM SPACING UNLESS LESSER SPACING IS RECOMMENDED BY MANUFACTURER.

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CATENARY DETAILS
TROLLEY DISCONNECT SWITCH DETAILS

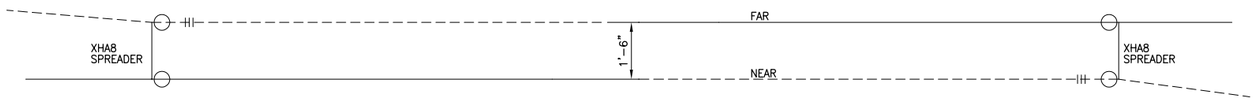
File No.:	2011-059-ET-1910.DWG
Ref. No.:	2011-059
Sheet No:	239 OF 347

ET-1910

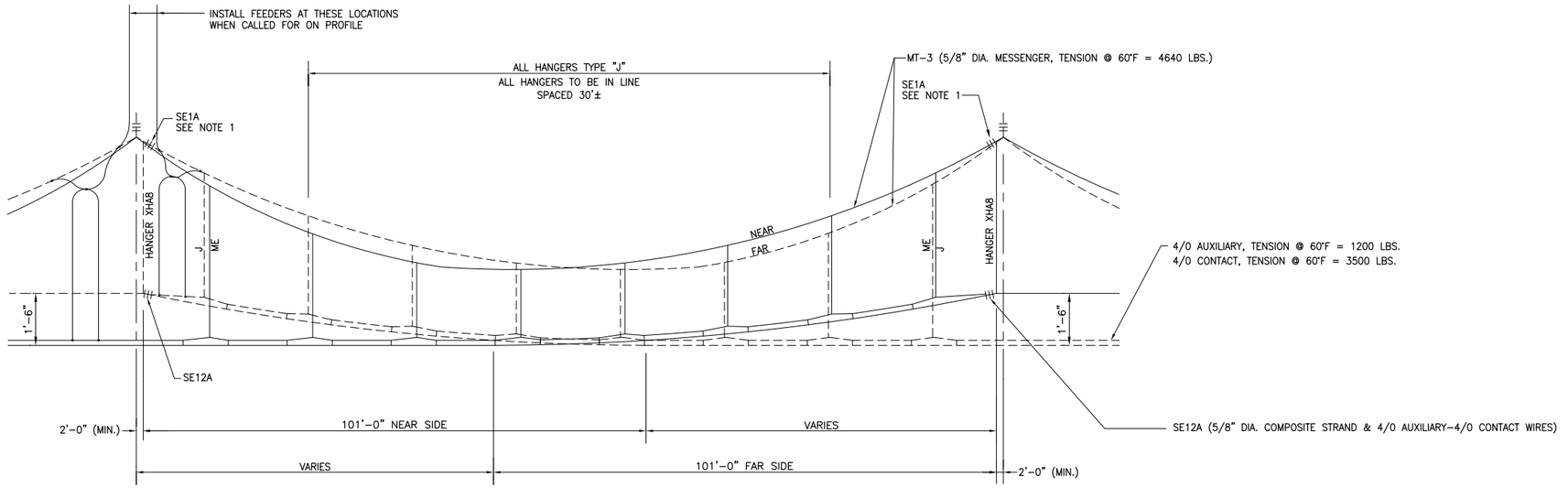
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BILL OF MATERIAL – PREFERRED ASSEMBLIES								
MARK	DESCRIPTION OF CONTACT WIRE	SE1A	SE4A	SE6A	SE8A	SE12A	XHA8 SPREADER	XHA8 HANGER
REF. DWG		ET1–017	ET1–017	ET1–017	ET1–017	ET1–017	ET1–019	ET1–019
UNIT		EA.	EA.	EA.	EA.	EA.	EA.	EA.
MT–3a	STR. GR. GR. STR.	2				2	2	2
MT–3b	GR. GR. GR. GR.	2			2		2	2
MT–3c	STR. GR. GR. GR.	2			1	1	2	2



PLAN VIEW



PROFILE

MAIN TRACK AIR BREAK (FULL TENSION)

MT–3

5/8" DIA. MESSENGER, 4/0 AUXILIARY & 4/0 CONTACT WIRES

NOTES:

1. WHENEVER INSULATORS SLOPE UPWARD FROM XHA8 HANGER, REVERSE INSULATORS FROM THEIR NORMAL POSITION, (SEE ET1–018, ELECTRIFICATION STANDARDS)
2. ALL HANGER LENGTHS ARE TO BE CALCULATED USING THE APPROPRIATE HANGER HARDWARE CONSTANTS AND TABULATED ON THE CATENARY PROFILE.

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ELECTRIFICATION
CATENARY DETAILS
FULL TENSION AIR BREAK (MT–3)

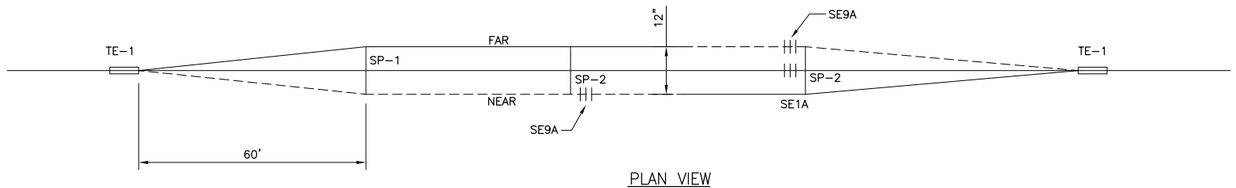
Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1911.DWG
Ref. No.:	2011–059
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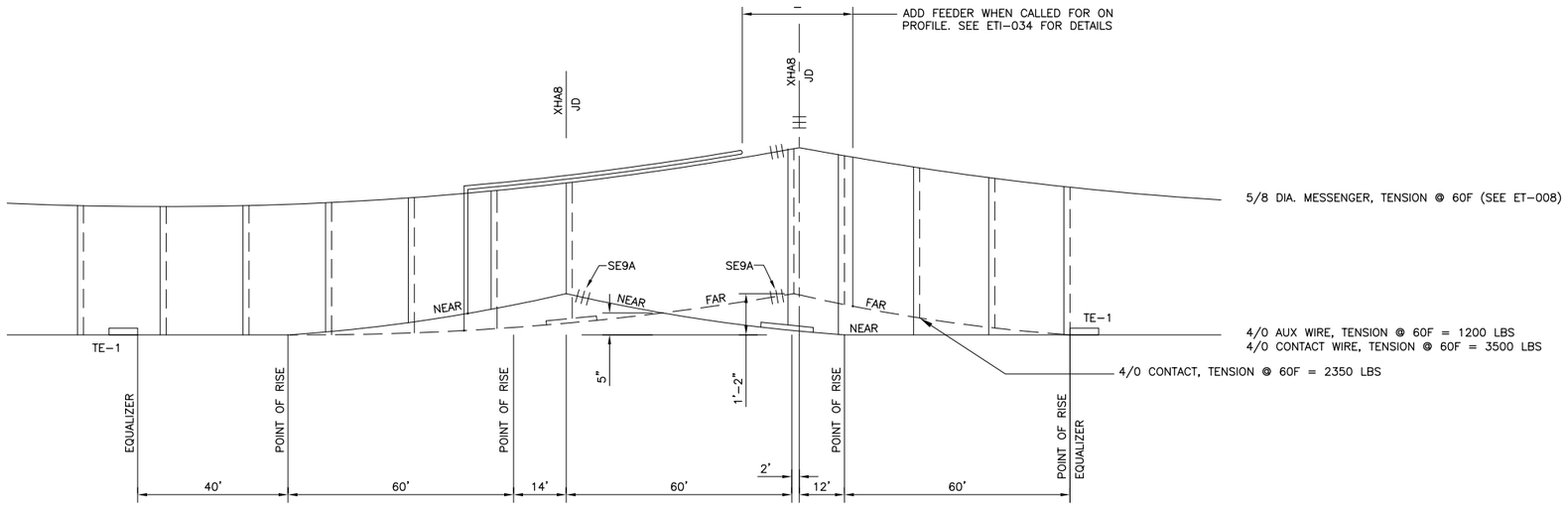
ET–1911

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BILL OF MATERIAL – PREFERRED ASSEMBLIES							
MARK	SE1A	SE9A	SP–1	SP–2	TE–1	XHA8	JD
REF. DWG	ET1–017	ET1–017	ET1–019	ET1–019	ET1–019	ET1–019	ET1–020
UNIT	EA.	EA.	EA.	EA.	EA.	EA.	EA.
Y–60A	1	2	1	2	2	2	2



PLAN VIEW



PROFILE

MAIN TRACK AIR BREAK (HALF TENSION) 3 WIRE SYSTEM

Y–60A

MESSENGER WIRE IS 5/8", AUX AND CONTACT WIRES ARE 4/0 BRONZE

NOTES:

1. USE CATENARY STANDARD XVI BEYOND TENSION EQUALIZERS FOR 5/8" MESSENGER WIRE.
2. USE CATENARY STANDARD XVII BEYOND TENSION EQUALIZERS FOR 7/16" MESSENGER WIRE.
3. ALL HANGER LENGTH ARE TO BE CALCULATED USING THE APPROPRIATE HANGER HARDWARE CONSTANTS AND TABULATED ON THE CATENARY PROFILE.
4. WHENEVER INSULATORS SLOPE UPWARD FROM HANGER "XHA8", REVERSE INSULATORS FROM THEIR NORMAL POSITION, SEE AMTRAK DRAWING ET1–018.
5. THIS DRAWING IS BASED ON AMTRAK DRAWING ET1–012.

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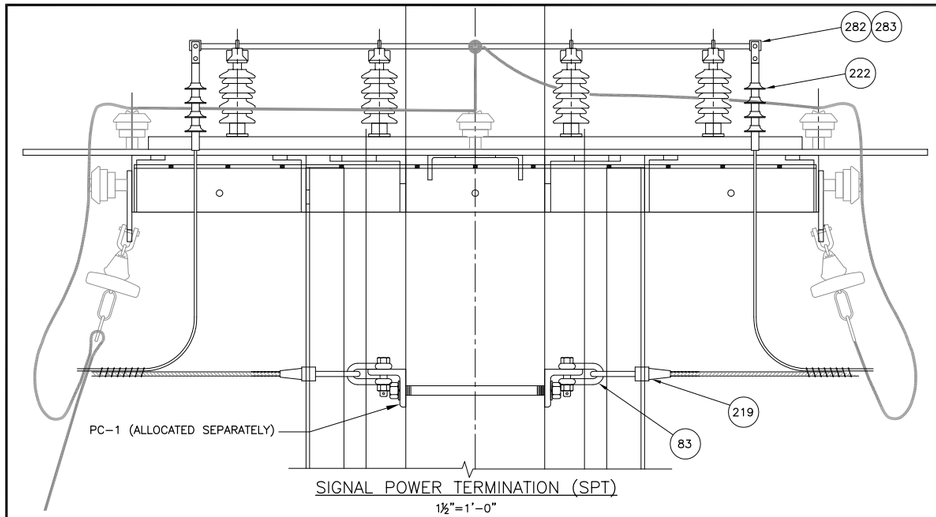
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
HALF TENSION AIR BREAK (Y–60)

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011–059–ET–1912.DWG
Ref. No.:	2011–059
Sheet No:	241 OF 347

ET–1912

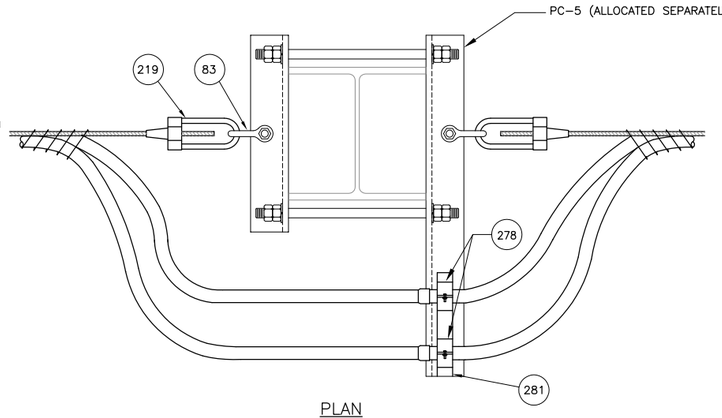
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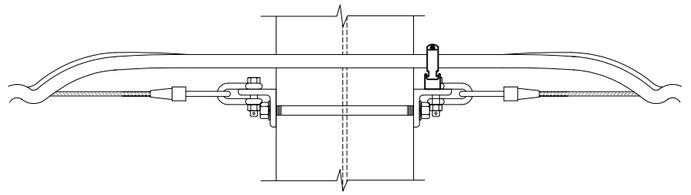
SIGNAL POWER TERMINATION (SPT)

1½"=1'-0"

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QUANTITY
83	S4	SHACKLE WITH BOLT	ET-305	2
219		AUTOMATIC DEAD END HUBBELL POWER SYSTEMS CAT. NO. GDE-702		2
222		3M COLD SHRINK TERMINATION 5633K		4
282	–	COPPER BAR 90°		2
283	–	1/2"x13-2" HEX BOLT, NUT & LOCK WASHER, BRONZE		12



PLAN



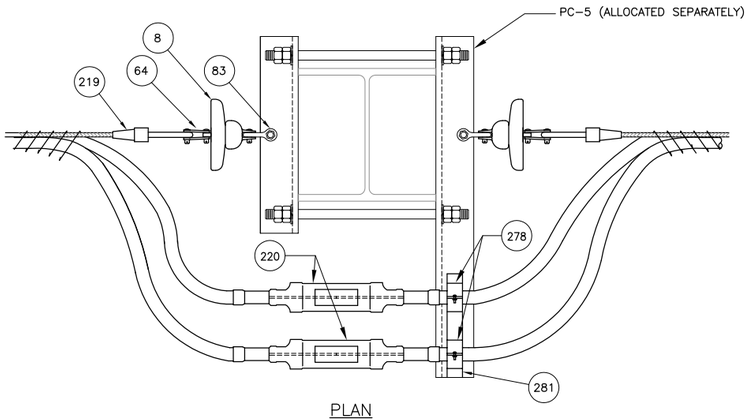
ELEVATION

BILL OF MATERIALS					
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	SPDE2 QUANTITY	SPDE3 QUANTITY
83	S4	SHACKLE WITH BOLT	ET-305	2	2
219		AUTOMATIC DEAD END HUBBELL POWER SYSTEMS CAT. NO. GDE-702		2	2
278	–	UNI-STRUT SPOOL, HDG		2	–
281	–	UNI-STRUT P1100, 1 5/8" x 1 5/8", HDG		1'-0"	–

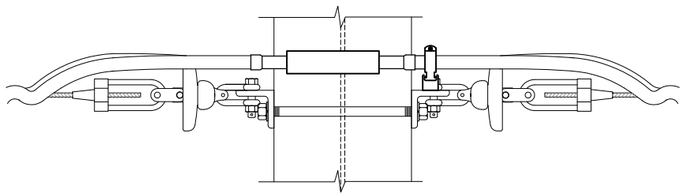
SIGNAL POWER DEAD END (SPDE2 & SPDE3)

1½"=1'-0"

NOTE: FOR INSULATED CABLE ONLY



PLAN

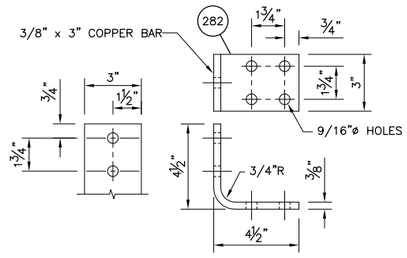


ELEVATION

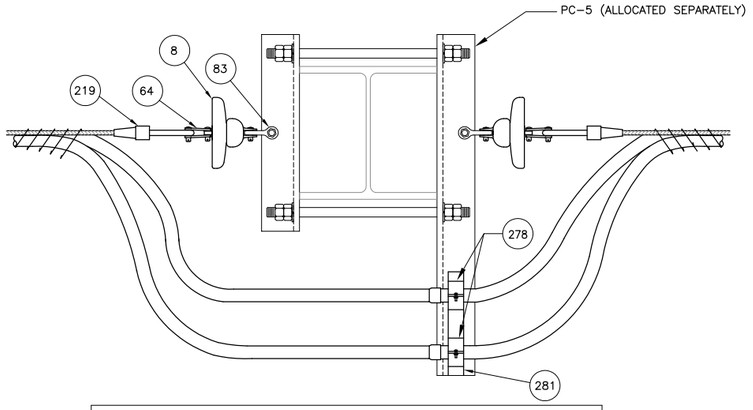
BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QUANTITY
8	B1	SUSPENSION INSULATOR	ET1-003	2
64	ND4	ADAPTER CLEVIS	ET-394E1	2
219		AUTOMATIC DEAD END HUBBELL POWER SYSTEMS CAT. NO. GDE-702		2
83	S4	SHACKLE WITH BOLT	ET-305	2
278	–	UNI-STRUT SPOOL, HDG		2
281	–	UNI-STRUT P1100, 1 5/8" x 1 5/8", HDG		1'-0"
220		COLD SHRINK SPLICE FOR #2 15kV		2

SIGNAL POWER SPLICE (SPSPL)

1½"=1'-0"



COPPER BAR BENT 90°

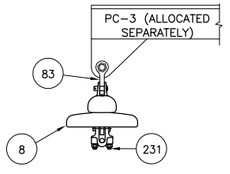


BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QUANTITY
8	B1	SUSPENSION INSULATOR	ET1-003	2
64	ND4	ADAPTER CLEVIS	ET-394E	2
219		AUTOMATIC DEAD END HUBBELL POWER SYSTEMS CAT. NO. GDE-702		2
83	S4	SHACKLE WITH BOLT	ET-305	2
278	–	UNI-STRUT SPOOL, HDG		2
281	–	UNI-STRUT P1100, 1 5/8" x 1 5/8", HDG		1'-0"

SIGNAL POWER DEAD END (SPDE1)

1½"=1'-0"

NOTE: FOR INSULATED CABLE ONLY



BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1-003	1
83	S4	SHACKLE WITH BOLT	ET-305	1
231	–	SUSPENSION CLAMP HUBBELL MS-70N	–	1

SIGNAL POWER SUPPORT (SPS)

NOT TO SCALE

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

CATENARY DETAILS

SIGNAL POWER SPLICING AND TERMINATION ASSEMBLIES

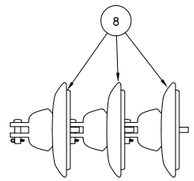
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File No.:	2011-059-ET-1913.DWG
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ET-1913

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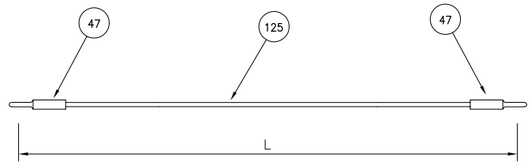
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3



ASSEMBLY "SE40a"
USE ON 7/16"ø STRAND

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
47	ES7/16	EYE SOCKET, 615.157.103	-----	2
125	---	7/16"ø COPPERWELD STRAND	-----	*

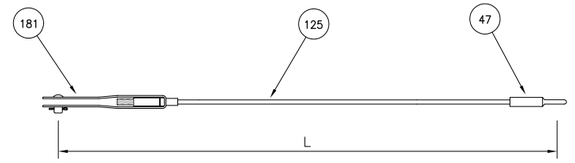
* – FOR LENGTH "L" SEE ERECTION DIAGRAM



ASSEMBLY "Za"
USE ON 7/16"ø STRAND

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
47	ES7/16	EYE SOCKET, 615.157.103	-----	1
125	---	7/16"ø COPPERWELD STRAND	-----	*
181	CS7/16	FORK COLLAR SOCKET F/ 7/16 WIRE	-----	1

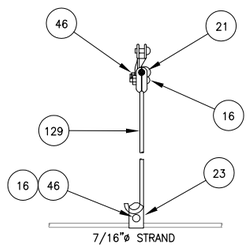
* – FOR LENGTH "L" SEE ERECTION DIAGRAM



ASSEMBLY "Ya"
USE ON 7/16"ø STRAND

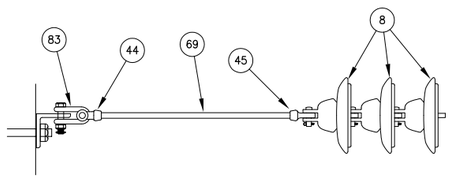
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB–22	BOLT, STAINLESS STEEL	ET–148E	2
21	BC–24B	5/8"ø TO 0.34"ø HANGER ROD, CLIP	ET–1087E	2
23	BC–25	7/16"ø TO 0.34"ø HANGER ROD, CLIP	ET–1088E	2
129	---	0.34"ø BRONZE ROD	ET–1095E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	2

* – FOR LENGTH SEE ERECTION DIAGRAM



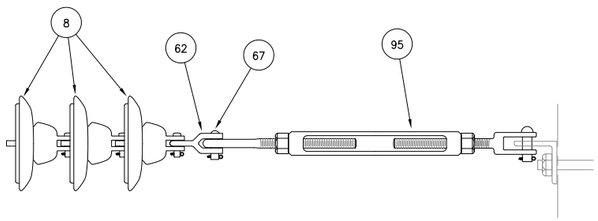
ASSEMBLY "SH60a"
SCALE: NONE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
44	CE1	CLEVIS END	11B–1227	1
45	EE1	EYE END	11B–1227	1
69	NR2	ROD, 0.72"ø, BRONZE	14E–433	1
83	S4	CHAIN SHACKLE	ET–305E	1



ASSEMBLY "SD30a"
USE ON 7/16"ø STRAND

BILL OF MATERIALS				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	3
62	ND–1	ADAPTER CLEVIS	ET–449E	1
67	NP–3	PIN WITH COTTER	11B–1206	1
95	TB–18A	TURNBUCKLE	ET–308D	1



ASSEMBLY "SD31a"
USE ON 7/16"ø STRAND

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IN ASSOCIATION WITH

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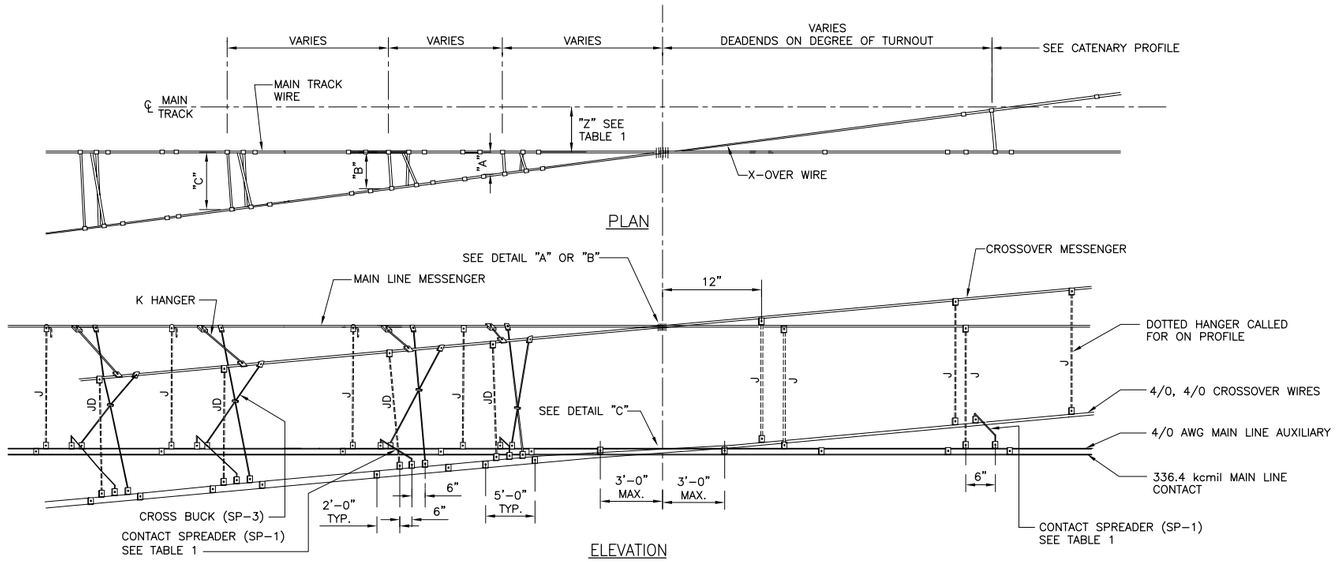
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
CATENARY DETAILS
STEADY SPAN ASSEMBLIES

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

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ET–1914

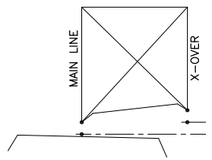
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ELEVATION

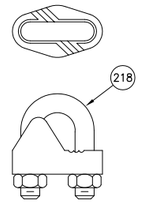
DEFLECTOR ARRANGEMENT FOR #20 TURNOUT
(HIGH SPEED)
NOT TO SCALE

TABLE 1							
SPREADER LENGTHS MAIN TRACK DEFLECTOR							
ALIGN.	'Z'	#20 & #15 X-OVER			#10 X-OVER		
		"A"	"B"	"C"	"A"	"B"	"C"
TAN.	0 to 4"	24"	30"	36"	18"	–	36"
TAN.	4" to 8"	18"	24"	30"	19"	–	30"
TAN.	8" to 12"	12"	18"	24"	12"	–	24"
CURVE	–	24"	30"	36"	24"	–	36"

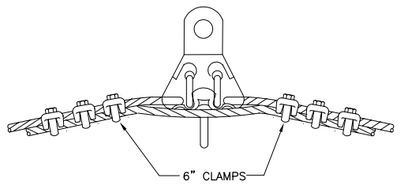


* CROSSOVER OR TURNOUT TROLLEY TO BE HEAL ABOVE THE TOP OF PANTOGRAPH ON THE RUNNING TRACK FROM THE FIRST X-BLOCK TO A POINT WHERE THE TROLLEY WIRES ARE SPREAD 5'-0".

MAINLINE TRACK
NOT TO SCALE

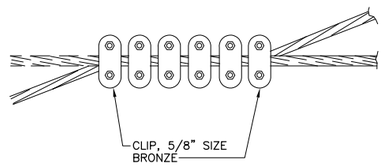


5/8" WIRE LOCK (WL)
SCALE: NONE



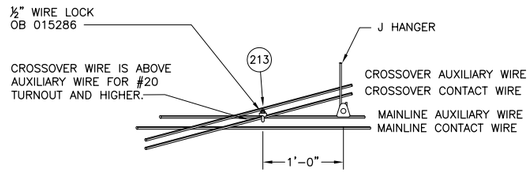
SHOWING RUNNING MESS. AND CROSSOVER SIDING MESSENGER WHEN CLIPPED TOGETHER AT A SUPPORT.

DETAIL "A"
NOT TO SCALE



SHOWING RUNNING MESS. AND CROSSOVER OR SIDING MESSENGER WHEN CLIPPED TOGETHER BETWEEN SUPPORTS.

DETAIL "B"
NOT TO SCALE



CONTACT TIE ARRANGEMENT

DETAIL "C"
NOT TO SCALE

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
DEFLECTOR ASSEMBLES

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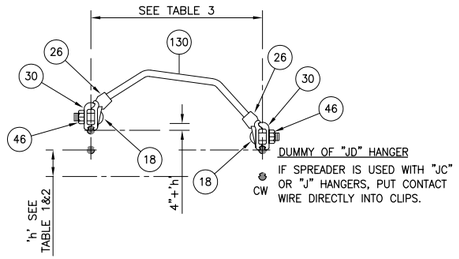
ET-1915

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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
18	SSB34	BOLT, STAINLESS STEEL	ET–148E	2
26	BC31	GROOVE WIRE TO 0.42"ø HANGER ROD	ET–1080E	2
30	BC37	FACING CLIP	ET–1083E	2
130	---	0.42"ø HANGER THR'D & THR'D TYPE	ET–1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	2

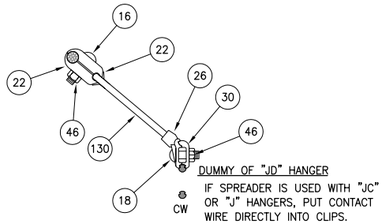
* – FOR LENGTH SEE TABULATION OR CATENARY PROFILES



DETAIL "SP1"
SPREADER ASSEMBLY

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
16	SSB22	BOLT, STAINLESS STEEL	ET–148E	1
18	SSB34	BOLT, STAINLESS STEEL	ET–148E	1
22	BC24C	5/8"ø TO 0.42"ø HANGER ROD	ET–1086E	2
26	BC31	GROOVE WIRE TO 0.42"ø HANGER ROD	ET–1080E	1
30	BC37	FACING CLIP	ET–1083E	1
130	---	0.42"ø HANGER THR'D & HOOK TYPE	ET–1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	2

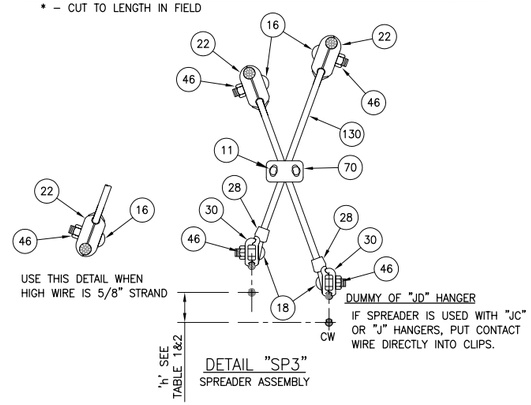
* – CUT TO LENGTH IN FIELD



DETAIL "SP2"
SPREADER ASSEMBLY

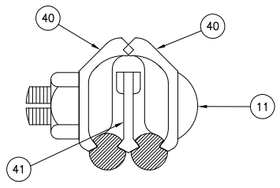
BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
11	BB3	BOLT	ET–148E	2
16	SSB22	BOLT, STAINLESS STEEL	ET–148E	2
18	SSB34	BOLT, STAINLESS STEEL	ET–148E	2
22	BC24C	5/8"ø TO 0.42"ø HANGER ROD	ET–1086E	4
28	BC33	GROOVE WIRE TO 0.42"ø HANGER ROD	ET–1081E	2
30	BC37	FACING CLIP	ET–1083E	2
70	DB	DEFLECTOR BRACE CLAMP	14E–100	2
130	---	0.42"ø HANGER THR'D & HOOK TYPE	ET–1096E	*
46	ERM	NUT ERM, 1/2 UNC SLOTTED SELF–LOCKING WASHER, 316 SS W/ ANTI–GALLING	ET1–100	4

* – CUT TO LENGTH IN FIELD



DETAIL "SP3"
SPREADER ASSEMBLY

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
11	BB3	BOLT	ET–148E	4
40	BTE2	CONTACT CLIP	ET–782E	2
41	BTE4	CONTACT CLIP	ET–782E	1



DETAIL TE1
FOR 4/0 CONTACT WIRE

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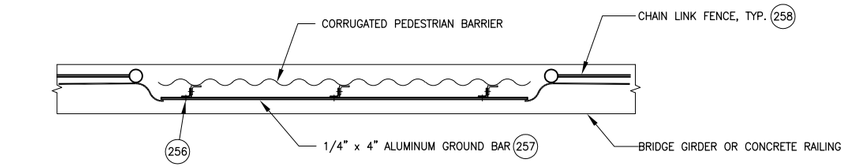
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
CATENARY DETAILS
DEFLECTOR ASSEMBLIES

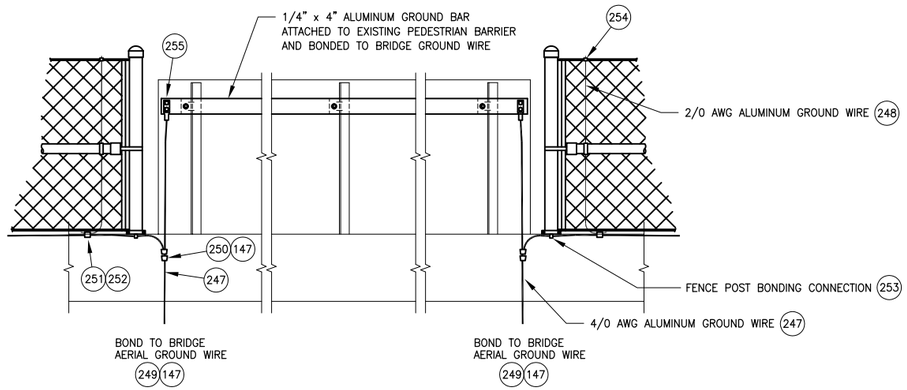
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BRIDGE BARRIER GROUNDING DETAIL "BBGD"

NOT TO SCALE

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	MANUFACTURER CATALOG NO.	QTY
247	–	4/0 AWG ALUMINUM WIRE, INSULATED 600V	–	50'
248	–	2/0 AWG ALUMINUM WIRE, INSULATED 600V	–	12'
249	–	AMPACT WEDGE CONNECTOR 4/0 TO 9/16ø	275187–1	2
147	–	AMPACT CARTRIDGE WHITE	69338–5	4
250	–	AMPACT WEDGE CONNECTOR 4/0 TO 4/0 ALUM.	600466	2
251	–	PARALLEL CLAMP 4/0 TO 2/0 ALUM, BURNDY	KVS–28–A	2
252	–	JOINT COMPOUND, PENETROX, BURNDY	–	A/R
253	–	PIPE CONNECTOR, TINNED CU FOR 4/0 ALUM, BURNDY	GAR – TP	2
254	–	PIPE CONNECTOR, TINNED CU FOR 2/0 ALUM, BURNDY	GAR – TP	2
255	–	COMPRESSION LUG FOR 4/0 ALUM. BURNDY	–	2
256	–	1/2" MOUNTING HARDWARE, STN STEEL	–	A/R
257	–	1/4" x 4" ALUM BAR, ALLOY 6101–T6	–	60 FT
258	–	CHAIN LINK FENCE (INSTALLED BY CONTRACTOR)	–	A/R

NOTE:

1. SEE DRAWING ET–0031 FOR ADDITIONAL AMTRAK REQUIREMENTS AT O.H. BRIDGES.

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ELECTRIFICATION
CATENARY DETAILS
O.H. BRIDGE GROUNDING AND BONDING

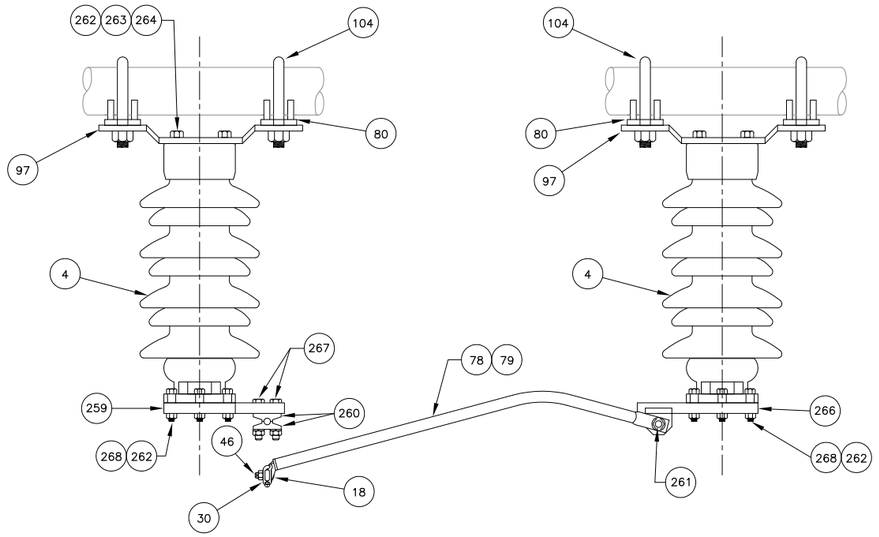
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Ref. No.:	2011–059
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ET–1917

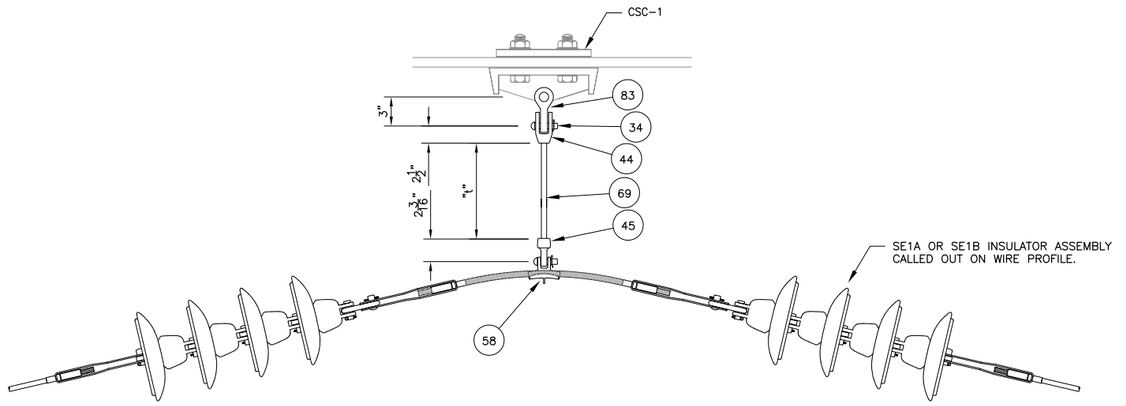
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BILL OF MATERIAL					
ITEM	MARK	DESCRIPTION	FAB STEEL DWG.	AMTRAK REF. DWG.	QTY
4	3T	RIGID INSULATOR		ET1–003	2
18	SSB–34	CARRIAGE BOLT		ET–148E	2
30	BC–37	FACING CLIP		ET–1083E	2
46	ERM	NUT 1/2"–13 SLOTTED SELF LOCKING		ET1–100	2
78	POL4	PULL OFF CATENARY TROLLEY BRZ (L)		14B–63	1
79	POR4	PULL OFF CATENARY TROLLEY BRZ (R)		14B–63	1
80	PS1A	PIPE SADDLE, GALV STEEL	S–5228	14E–133	4
97	TP1	BENT PLATE, GALV STEEL	S–5229	ET–1183E1	2
104	UB60	U–BOLT, 0.875 DIA. X 7.812 LNG X 5.5		ET–145–E	4
259	TP3	PLATE FOR PULLOFF ARMS, GALV STEEL	S–5229	ET–1182E	1
260	1–B	YOKE BLOCK ASSEMBLY		ET–978–E	2
261	–	3/4" DIA SHAFT W/ 5/8" NUTS, GALV.		–	1
262		LOCKWASHER 5/8" GALVANIZED			8
263		HEX HEAD BOLT 5/8" X 1 1/2" GALV.			8
264		FLAT WASHER 5/8" GALVANIZED			8
266	TP4	PLATE. FOR PULLOFF ARMS, GALV STEEL	S–5229		1
267	BB37	BRONZE BOLT W/ NUT 1/2" DIA.		ET–516–E	2
268	–	5/8" X 2 1/2" BOLT AND NUT, GALV.			8



ASSEMBLY P0A90A
SCALE: NONE

BILL OF MATERIAL (NA28X MESSENGER ASSEMBLY)				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QUANTITY
34	BG1	BOLT	ET–145E	1
44	CE1	CLEVIS END	11B–1227	1
45	EE1	EYE END	11B–1227	1
58	MK1	MESSENGER HOOK	ET–1146–D	1
69	NR2	HANGER ROD, .72" DIA.	14E–433	1
83	S4	SHACKLE	ET–305	1



NA28X
MESSENGER ASSEMBLY
SCALE: NONE

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CATENARY DETAILS
MESSENGER SUPPORT ASSEMBLY

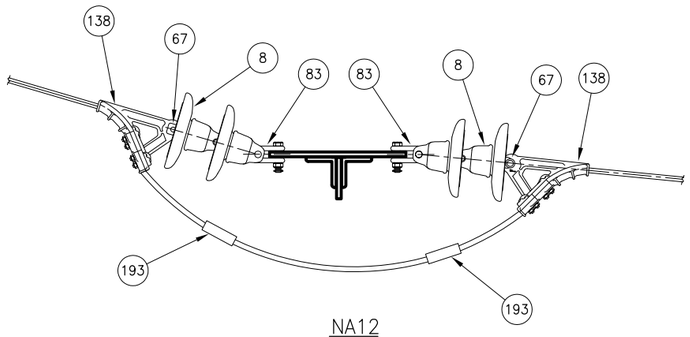
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ET–1918

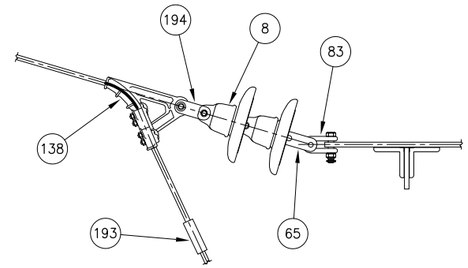
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BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	4
67	NP3	PIN	11B–1206	2
83	S4	SHACKLE WITH BOLT	ET–305	2
138	NC3	STRAIN CLAMP	11B–1211	2
193	---	SPLICE SLEEVE, FOR 1/0 WIRE	11B–1226	2



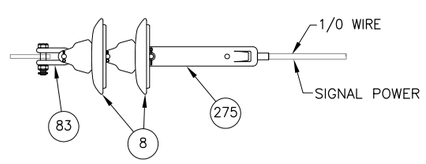
NA12
MIN. CLEAR. FROM STEEL–12"
O.H. BRIDGE SIGNAL INSULATOR
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	2
65	ND5	CLEVIS ADAPTER WITH PIN	ET–394E	1
83	S4	SHACKLE WITH BOLT	ET–305	1
138	NC3	STRAIN CLAMP	11B–1211	1
193	---	SPLICE SLEEVE, FOR 1/0 WIRE	11B–1226	1
194	NT	EXTENSION STRAP	11B–1222	1



NA14
FOR STEEP SLOPES, UPWARD
O.H. BRIDGE SIGNAL INSULATOR
N.T.S.

BILL OF MATERIAL				
ITEM	MARK	DESCRIPTION	AMTRAK REF. DWG.	QTY
8	B1	INSULATOR	ET1–003	2
83	S4	SHACKLE WITH BOLT	ET–305	1
275	–	FORKED COLLAR SOCKET, FOR 1/0 WIRE	-----	1



FD1G
FEEDER DEADEND
N.T.S.

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No	Revisions	Date	By

AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

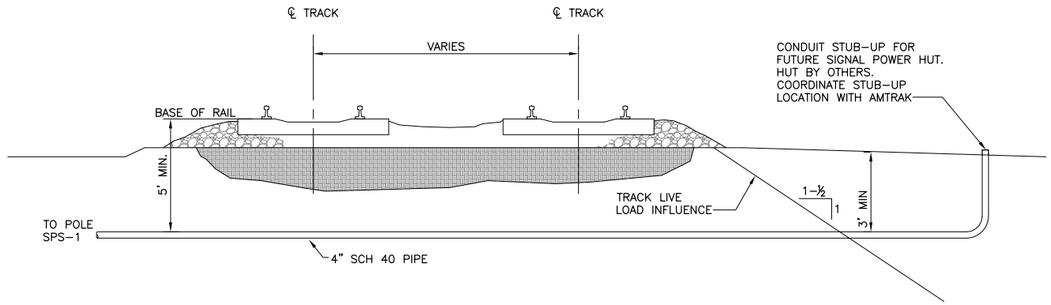
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
CATENARY DETAILS
SIGNAL POWER BARE WIRE SPLICE AND TERMINATIONS

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	2011-059-ET-1920.DWG
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1 / ET–1930 TYPICAL DETAIL - CONDUIT CROSSING UNDER TRACKS
NOT TO SCALE

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
CATENARY DETAILS
CONDUIT CROSSING UNDER TRACKS

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	2011-059-ET-1930.DWG
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ET–1930

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CATENARY/TRANSMISSION BILL OF MATERIAL

ID	MARK	AMMES	REF. DWG.	DESCRIPTION	SUGGESTED MANUFACTURER	UNIT	QTY
1	1130A	2104504659	ET-1130E	STRAP, GALV STEEL		EA	1
3	2T	4413500803	ET1-003	INSULATOR, PORCELAIN, TYPE- 2T FOR E.T.	VICTOR INSULATORS	EA	10
4	3T	4413500804	ET1-003	INSULATOR, PORCELAIN, TYPE- 3T FOR E.T.	VICTOR INSULATORS	EA	24
6	CS5/8	4401520222	DWG 6.3225	FORKED COLLAR SOCKET, FOR 5/8" DIA CAT MESSENGER WIRE	ARTHUR FLURY, 610.047.000	EA	36
8	B1	4477004402	ET1-003	INSULATOR, SUSPENSION, RR TYPE B1 CLEVIS	VICTOR INSULATORS	EA	8581
14	BB7	4456205002	ET-148E	BOLT, MACHINE 0.625X03.500 HEX HEAD 5/8 X 3-1/2 11 UNC-2A W/ LOCKWASHER		EA	16
16	SSB22	4421000658	ET-148E	STAINLESS STEEL BOLT 1/2-13x2", 316 SS		EA	10727
18	SSB34	4421000659	ET-148E	STAINLESS STEEL BOLT 1/2-13 x 1 5/8", 316 SS		EA	3610
21	BC24B	4456217708	ET-1087E1	CLIP, 5/8 IN MESS, 0.34 IN DIA. HANGER	BRIDESBURG FOUNDRY	EA	7132
22	BC24C	4456217505	ET-1086E1	CLIP, MESSENGER, TO .42"DIA. ROD BC-24-C	BRIDESBURG FOUNDRY	EA	6390
23	BC25	4456217601	ET-1088E1	CLIP, MESS., 7/16", BRONZE	BRIDESBURG FOUNDRY	EA	32
24	BC26B	4456217900	ET-1078E5	CLIP, GROOVED WIRE, 0.34" DIA., BC-26-B	BRIDESBURG FOUNDRY	EA	7900
25	BC30	4456215104	ET-1079E2	CLIP, GROOVED WIRE, TO .42" DIA ROD	BRIDESBURG FOUNDRY	EA	420
26	BC31	4456215307	ET-1080E2	CLIP, GROOVED WIRE, 0.42"DIA. BRONZE	BRIDESBURG FOUNDRY	EA	1425
27	BC32	4404511905	ET-1178E2	CLIP, GROOVED WIRE, BC32, 0.42" DIA	BRIDESBURG FOUNDRY	EA	1250
28	BC33	4456215200	ET1081E2	CLIP, GROOVED WIRE, 0.42"DIA. BRONZE	BRIDESBURG FOUNDRY	EA	100
29	BC34	4456215606	ET-1089E2	CLIP, HORIZONTAL, STEADY, BRONZE BC-34	BRIDESBURG FOUNDRY	EA	32
30	BC37	4404511702	ET-1083E2	CLIP, FACING, BOLTED TYPE, BRONZE	BRIDESBURG FOUNDRY	EA	48
34	BG1	4456204501	ET-145E	BOLT, MACHINE 0.750X02.750 HEX HEAD		EA	540
35	BG2	4403003757	ET-145E	BOLT, MACHINE 0.625X02.500 HEX HEAD		EA	13
44	CE1	4404508001	11B1227-5	CLEVIS, END, BRONZE	BRIDESBURG FOUNDRY	EA	716
45	EE1	4407504508	11B1227-5	EYE, END, BRONZE FOR HANGER ROD	BRIDESBURG FOUNDRY	EA	372
46	ERM	4421000657	ET1-100	ERM NUT 1/2 UNC SLOTTED SELF-LOCKING+ WASHER, 316 SS + ANTI-GALLING		EA	13971
47	ES7/16	4407505107	DWG 6.3636	EYELET COLLAR SOCKET, FOR 7/16" DIA. 7 STRND COPPERWELD WIRE	ARTHUR FLURY, 615.157.103	EA	33
49	FHS	4456225708	ET-652E9	SADDLE, FLEXIBLE HANGER ROD, BRONZE		EA	400
51	HC29A	4456215702	ET-1029E	CLIP, INTERMEDIATE, ALUM-BRZ, HC29A	BRIDESBURG FOUNDRY	EA	3196
52	HSC	445621120X	ET-918E1	CLAMP, STEADY, BRONZE		EA	32
54	JB	445620160X	ET-148E15	BOLT, HOOK 0.500X02.375		EA	838
55	LK2	4418001009		WELDLESS LINK, 5/8" SIZE GALV STEEL	CROSBY	EA	12
57	MD5	4456226305	ET-1124E2	SADDLE, 5/8" MESSENGER, DUCTILE IRON		EA	16
58	MK1	4456221504	ET-1146D1	HOOK, MESSENGER, MI GALV	VERNON MARTIN	EA	419
60	MWS	4456225804	ET-170E3	SADDLE, MESSENGER, WIRE BRONZE, MWS	BRIDESBURG FOUNDRY	EA	2
61	ND	4401500207	11B-1212	ADAPTER, CLEVIS		EA	2
62	ND1	4456200201	ET-449E3	ADAPTER, CLEVIS	VERNON MARTIN	EA	65
64	ND4	4456200607	ET-394E1	ADAPTER, CLEVIS, (REF: BT-3075)		EA	16
65	ND5	4456200500	ET-394E1	ADAPTER, CLEVIS		EA	8
66	NP1	4456223809	11B-1206	PIN, FOR INSULATOR, 5/8 X 1-7/8"		EA	406
67	NP3	4456223702	11B-1206	PIN, FOR INSULATOR, GALV. STEEL		EA	21
69	NR2	210300285X	14E-433-1	HANGER ROD MATERIAL .72 DIA. BRONZE		EA	544
70	DB	4456212202	14E-100-2	CLAMP, DEFLECTOR, BRACE, BRONZE		EA	1
77	PO3	4456224609	14B-63-6	PULL OFF CATENARY TROLLEY BRONZE		EA	1
78	POL4	4456225003	14B-63-6	PULL OFF CATENARY TROLLEY BRONZE (L)	UNITED KNITTING	EA	8
79	POR4	4456225206	14B-63-6	PULL OFF CATENARY TROLLEY BRONZE (R)	UNITED KNITTING	EA	8
80	PS1A	4456208908	14E-133-1	PIPE SADDLE, PS-1A GALV STEEL		EA	NOTE 1
81	S	44770050X	ET1-003	INSULATOR, RR TYPE S,SPEC 560B 1-3/8"PIN		EA	120
82	S2	4456227105	ET-305	SHACKLE CHAIN W/BOLT NUT & COTTER		EA	172
83	S4	4456227009	ET-305	SHACKLE CHAIN W/BOLT NUT & COTTER		EA	1668
84	S20	4456226807	ET-305E4	SHACKLE, CHAIN W/BOLT, NUT & COTTER 11/16" STOCK, BOLT: 7/8" X 4" W/1-1/2"		EA	20
93	SR	4427000606	ET-1095E	ROD, STEADY, 0.48" DIA.		EA	32
94	SWS	4456226209	ET-170E	SADDLE, STEADY WIRE BRONZE DET. SWS	BRIDESBURG FOUNDRY	EA	35
95	TB18A	4456234604	ET-308D	TURNBUCKLE, 1" DIA. CLEVIS & EYE, CROSBY #HG227	CROSBY	EA	25

CATENARY/TRANSMISSION BILL OF MATERIAL – CONTINUED

ID	MARK	AMMES	REF. DWG.	DESCRIPTION	SUGGESTED MANUFACTURER	UNIT	QTY
96	TH3	4445407709	11B-1234-3	THIMBLE, CAST BRONZE		EA	1
97	TP1	4456224406	ET-1183E1	PLATE, FOR OVERHEAD BRIDGE, GALV. STEEL		EA	NOTE 1
98	TP2	4456224502	ET-1183E1	PLATE, 1/2 X 3 X 8 IN, FOR OVERHEAD BRIDGE, GALV STEEL		EA	NOTE 1
102	UB27	4456207905	ET-145E24	U-BOLT, 0.625 DIA. X 2.875 LONG X 1.5 OPENING	HAYDON BOLTS	EA	35
104	UB60	4456208107		U-BOLT, 0.875 DIA. X 7.812 LONG X 5.500 OPENING C TO C X 1.750 THREAD		EA	48
106	WL3	4404510005	ET-556E4	CLIP, CABLE, LEFT LAY, 0.437, BRONZE, 7/16"	BRIDESBURG FOUNDRY	EA	39
107	WL	4404509506	ET-556E4	CLIP, CABLE, LEFT LAY, 0.625, BRONZE, 5/8"	BRIDESBURG FOUNDRY	EA	114
120		213001790X		1.125 BRZ TUBE		EA	1.5
121				1/4" COPPER FILLER		EA	2
129		2103002550	ET-1095E	HANGER ROD MATERIAL .34 DIA. BRONZE (REF: JR), AS REQUIRED		FT	13498
130		2103002454		HANGER ROD MATERIAL .42 DIA. BRONZE, AS REQUIRED		FT	14945
132		442400111X		PIN FOR TYPE "S" INSULATOR WITH 3/4" NUT, ET-288E-2		EA	120
138	NC3	4456211402	11B-1211-5	CLAMP, STRAIN, 1/0 7 STRAND		EA	24
147		4442300607	693385	CARTRIDGE, AMPACT WHITE TYPE	AMP/TYCO	EA	391
148		4401500309	694724	CARTRIDGE, AMPACT RED TYPE	AMP/TYCO	EA	52
149		4401500308	69338-1	CARTRIDGE, AMPACT BLUE TYPE	AMP/TYCO	EA	212
150		4442302004	275187-6	WIRE TAP 4/0 TO 4/0	AMP/TYCO	EA	361
153		4442302303	3-276337-4	WIRE TAP 400 TO 4/0	AMP/TYCO	EA	36
154		4442302207	3-276337-0	WIRE TAP 400 TO 400	AMP/TYCO	EA	88
155		4442302100	3-276337-3	WIRE TAP 400 TO 5/8	AMP/TYCO	EA	36
176	TB3	4456233900		TURNBUCKLE, 2" DIA WITH CLEVIS END LH THRDS	CROSBY	EA	37
177	VG2		VG-0-2105	VARI-GRIP DEAD END FOR 1" EHS GUY WIRE, 0" ADJUSTMENT		EA	74
178	UB36	4456207606	ET-145E24	U-BOLT		EA	37
181	CS7/16	4407505106	DWG 6.3201	FORKED COLLAR SOCKET, FOR 7/16" DIA. 7 STRND COPPERWELD WIRE	ARTHUR FLURY, 610.028.103	EA	14
185		4404507252	LAPP 57111	CLAMP, TRUNNION BASE	LAPP 57111	EA	183
187	BP-1			BACK PLATE DETAILS FOR DOWN GUY		EA	NOTE 1
188		4445405201		SERVIT POST CONNECTOR FOR 4/0 5/8-11 STUD	BURNDY KC28B1	EA	30
189				SERVIT POST CONNECTOR FOR 9/16 BARE CU FOR 1/2" DIA. STUD	BURNDY KC31B1	EA	268
190			LAPP 47102	CLAMP, TOP BRACKET, MALLEABLE IRON, GLAV.	LAPP 47102	EA	366
193			11B-1226	SPLICE SLEEVE, FOR 1/O WIRE		EA	24
194	NT		11B-1222	EXTENSION STRAP		EA	8
196			YA322N	400 MCM SWITCH TERMINAL LUG, NEMA 4	BURNDY, YA322N	EA	26
203	CS400	4401500418	DWG 6.3225	FORKED COLLAR SOCKET, FOR 400,000CM FEEDER WIRE	ARTHUR FLURY, 610.061.000	EA	44
204	CS9/16	4401500415	DWG 6.3225	FORKED COLLAR SOCKET, FOR 9/16" DIA. 19 STRND COPPERWELD WIRE	ARTHUR FLURY, 610.090.000	EA	138
212				ARMOR GRIP SUSPENSION	PREFORMED, AGS-5118	EA	346
213				DEADEND QUADRANT	MACLEAN POWER SYSTEMS, ADE-24-C	EA	242
214				Y-CLEVIS-CLEVIS, DUCTILE IRON, GALV, 30,000 LBS	HUBBLE YCC30	EA	242
215				GALVANIZED STRAP 1/2" x 2" x 14" LONG		EA	NOTE 1
216				COMPRESSION SPLICE	HUBBLE, JLS1010	EA	242
219				AUTOMATIC DEADEND	HUBBELL, GDE-702	EA	66
220				COLD SHRINK SPLICE	3M, 5513A	EA	12
222				COLD SHRINK TERMINATION	3M, 5633K	EA	64
224				CUSHION CLAMP WITH Y-CLEVIS FOR OPGW	FIBERLIGN, 4700113	EA	86
231				SUSPENSION CLAMP, DUCTILE IRON	HUBBELL MS-70N	EA	132
232				WIRE TAP #4 TO #4	AMPACT 277060-3	EA	26
233				WIRE TAP 1/0 TO #4	AMPACT 277060-1	EA	26
234		4404509901		CLIP 3/8", BRONZE	BRIDESBURG FOUNDRY 3/8" WIRELOCK	EA	104
235		02-180-03562		LUG - FOR 1/0, COMP. TYPE		EA	96

CATENARY/TRANSMISSION BILL OF MATERIAL – CONTINUED

ID	MARK	AMMES	REF. DWG.	DESCRIPTION	SUGGESTED MANUFACTURER	UNIT	QTY
236		44-950-01600		CUTOUT FUSE, ENCLOSED, 7.8KV, 50 AMP		EA	30
237		02-949-50705		LIGHTNING ARRESTOR, 9KV		EA	30
238				LUG - FOR 2/0 COMP.		EA	8
239			SA-FTSA47-01	STEADY ARM ALUMINUM WITH CLEVIS END, LENGTH VARIES: 4.75', 4.43',		EA	263
240			B3431-01	CLEVIS PIPE FOR STEADY ARM		EA	263
241			B0408-01	CLEVIS CLAMP FOR PIPE		EA	287
242			B0505-01	COMPONENT EYE FOR PIPE, SCH 80		EA	287
243			B0505-03	COMPONENT CLEVIS FOR PIPE, SCH 80		EA	263
244				COTTER PIN, STN STEEL 3/16" DIA X1"		EA	263
245				PIPE, 2" NOM. DIA, ALUMINUM, SCH 80		FT	2941
246			B0407-01	SYNTHETIC PIPE INSULATOR, 2" DIA PIPE, SEDIVER INC REF # TU80XG015		EA	263
259	TP3		ET-1182-E	PLATE WELDMENT FOR PULLOFF ARMS, GALVANIZED STEEL		EA	NOTE 1
260	1-B		ET-978-E	YOKE BLOCK ASSEMBLY, BRONZE		EA	16
261				3/4" DIA. BRONZE SHAFT W/ 5/8 NUTS AND COTTER PINS		EA	NOTE 1
262				LOCKWASHER 5/8" GALVANIZED		EA	64
263				HEX HEAD BOLT 5/8" X 1 1/2" GALVANIZED		EA	64
264				FLAT WASHER 5/8" GALVANIZED		EA	64
266	TP4			PLATE WELDMENT FOR PULLOFF ARMS, GALVANIZED STEEL		EA	NOTE 1
267	BB37		ET-516-E	BRONZE BOLT		EA	16
268				5/8"X2 1/2" BOLT AND NUT. GALVANIZED		EA	64
269				TAP, 1/0 CU. TO 1/0 CU. AMPACT #1-275187-8		EA	30
270				SERVIT POST, #4 AWG TO FLAT, BURNDY KC23 1/2-13 STUD	BURNDY KC23	EA	30
271	SW		ET-1919	TROLLEY DISCONNECT SWITCH, 1200 AMP, 34KV	TURNER SWITCH	EA	13
272	MOD		ET-1919	MOTOR OPERATOR, 125 VDC FOR TROLLEY SWITCH	TURNER SWITCH	EA	13
278				UNI-STRUT SPOOL, HDG,	UNI-STRUT, P1788C	EA	22
279				EXTENSION LINK WITH PIN & COTTER KEY,	PREFORMED PRODUCTS, #00060132	EA	6
280				FIBERLIGN DEAD-END FOR OPGW	PREFORMED PRODUCTS, #2801321	EA	6
281				UNI-STRUT P1100, 1 5/8" X 1 5/8", HDG		FT	11
282				COPPER BAR 90o		EA	32
283				1/2-13x2" HEX BOLT, NUT & LOCKWASHER, BRONZE		EA	192
300				SIGNAL POWER TRANSFORMER, OIL FILLED 6.9kV TO 240V/120V, 10KVA		EA	15
301				DISCONNECT SWITCH DPST, 15kV, 600A, W/ ALL OPERATING RODS AND HARDWARE		EA	26
302				MANUAL OPERATOR FOR DISCONNECT - SWITCH		EA	26
303				SIGNAL POWER SWITCH PLATFORM		EA	13
304				SIGNAL POWER TRANSFORMER PLATFORM		EA	13
WIRES AND CABLES							
165		4404503251	ET0093	WIRE, ELE 9 AWG, 1 COND, 19 STRAND 9/16"BARE COPPERWELD 40% CONDUCTIVITY		FT	72726
			ET0093	477 KCMIL "HAWK" ACSR		FT	143718
			ET0094	INSULATED SIGNAL POWER, 2C#2 & 3/8		FT	33921
125		4404502005		7/16" COPPERWELD 7 NO. 7 HS 12,670 LB BREAKING STRENGTH		FT	205
159		4434501601		WIRE, ELE 4/0 AWG 19 STRDS		FT	180
162		4404502355		WIRE, ELE 4 AWG, 1 COND 7 WIRES, 9/64" INSULATION		FT	700
171		4404500800		WIRE, ELE, MCM 400, 1 COND, COPPER HARD DRAWN, 37 STRANDS, .728 DIA.		FT	620
174				1" EHS GUY WIRE, GALV STEEL		FT	1850

NOTES:

1. SEE CATENARY STEEL BILL OF MATERIAL ON ET–1934 FOR ITEM QUANTITIES.

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30TH Street Station–Philadelphia, Pennsylvania 19104

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IN ASSOCIATION WITH

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
MASTER BILL OF MATERIAL
CATENARY / TRANSMISSION

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-1932.DWG
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ET–1932

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SUBSTATION AND SIGNAL POWER BILL OF MATERIAL

ID	MARK NO.	AMMES	DESCRIPTION	UNIT	QTY	REF. DRAWING
83	S4	4456227009	SHACKLE CHAIN W/BOLT NUT & COTTER	EA	2	ET-305
222			COLD SHRINK TERMINATION, 3M 5513A	EA	4	
320			TRANSFORMER, POTENTIAL, OIL-IMMERSED, 100Hz, 6.9kV/120V	EA	2	
323			LIGHTNING ARRESTOR, 1-POLE, 9kV	EA	4	
324			SIGNAL POWER TRANSFORMER, 75 KVA, 100 Hz, 480V TO 6.9kV	EA	1	
325			DISCONNECT SWITCH, 15kV, 2 POLE, 600 AMP	EA	4	
326			CIRCUIT BREAKER, OUTDOOR, HIGH-SPEED, 2-POLE, 100Hz, 15kV@ (SIG PWR)	EA	2	
339			4" CONDUIT, SCH 80, PVC	LF	210	
340			3" CONDUIT, SCH 80, PVC	LF	150	
365			CURRENT TRANSFORMER, 25 KV, 100 HZ, BB-25-973, ABB	EA	1	
366			FUSED DISCONNECT, 7.8 KV EU, 100A WITH MOUNTING BRACKET, ABB	EA	4	
368			ALTOS FIGURE 8 FIBER OPTIC GEL-FREE CABLES-12 STRAND	LF	150	

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AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
MASTER BILL OF MATERIAL
SUBSTATION AND SIGNAL POWER

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-1933.DWG
Ref. No.:	2011-059
Sheet No:	251 OF 347

ET-1933

CATENARY STEEL BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	DRAWING	QTY
S-1	P	POLE	S-5103	216
S-2	MP	MONO POLE	S-5109	8
S-3	F1	FOUNDATION FOR K-FRAME (4'-0" DIA.)	S-5102	192
S-4	F7	FOUNDATION FOR MONOPOLE (4'-6" DIA.)	S-5111	8
S-5	SB1	SAG BRACE	S-5105	192
S-6	CB1	CROSS BEAM	S-5104	96
S-7	DGA	DOWN GUY ANCHOR	S-5101	30
S-8	DGA2	DOWN GUY ANCHOR - DOUBLE	S-5101	2
S-9	DGP	DOWN GUY POLE	S-5123	NOTE 1
S-10	BA1	TRANSMISSION BRACKET - DOUBLE	S-5200	89
S-11	BA2	TRANSMISSION BRACKET	S-5201	36
S-12	BA2A	TRANSMISSION BRACKET	S-5201	7
S-13	BA2B	TRANSMISSION BRACKET	S-5201	1
S-14	BA3	TRANSMISSION BRACKET - DOUBLE	S-5202	37
S-15	BA4	TRANSMISSION BRACKET	S-5203	23
S-16	BA4L	TRANSMISSION BRACKET	S-5203	4
S-17	BA6	TRANSMISSION BRACKET	S-5204	14
S-18	BA7	TRANSMISSION BRACKET	S-5205	62
S-19	BA7A	TRANSMISSION BRACKET	S-5205	8
S-20	BA8	TRANSMISSION BRACKET - DOUBLE	S-5206	16
S-21	CSC1	SLIDING BRACKET	S-5214	811
S-22	CA1	FEEDER CROSS ARM	S-5212	7
S-23	SPA	SPIDER ARM BRACKET	S-5213	5
S-24	PC1	SLIDING CLAMP	S-5214	37
S-25	PC1D	SLIDING CLAMP	S-5211	2
S-26	PC1G	SLIDING CLAMP	S-5211	1
S-27	PC1H	SLIDING CLAMP	S-5211	NOTE 1
S-28	PC2	SLIDING CLAMP	S-5214	16
S-29	PC3	SLIDING CLAMP	S-5215	115
S-30	PC4	SLIDING CLAMP	S-5215	81
S-31	PC3L	SLIDING CLAMP	S-5215	6
S-32	PC4L	SLIDING CLAMP	S-5215	5
S-33	PC5	SLIDING CLAMP	S-5215	8
S-34	PC7	SLIDING CLAMP	S-5239	5
S-35	PC8	SLIDING CLAMP	S-5240	NOTE 1
S-36	UBA1	UNDER BRIDGE BRACKET	S-5228	16
S-37	UBSP	UNDER BRIDGE BRACKET	S-5240	8
S-38	FB1	FEEDER BRACKET - FOUR	S-5226	7
S-39	FB2	FEEDER BRACKET - SINGLE	S-5227	7
S-40	POST	POST EXTENSION	S-5106	1
S-41	DGB	DOWN GUY BRACE	S-5110	1
S-42	---	CANTILEVER ARM		1
S-43	BN1	CANTILEVER END BRACKET		1
S-44	TP1	FORMED MOUNTING PLATE (CAT BOM #97)	S-5229	24
S-45	TP2	TOP PLATE (CAT BOM #98)	S-5229	8
S-46	TP3	BASE PLATE (CAT BOM #259)	S-5229	8
S-47	TP4	BASE PLATE (CAT BOM #266)	S-5229	8
S-48	BP1	BACK PLATE DETAIL FOR DOWN GUY (CAT BOM #187)	S-5230	34
S-49	RS1	ROD SUPPORT	S-5225	10
S-50	HO1	MANUAL OPERATOR SUPPORT	S-5225	NOTE 1
S-51	MO1	MOTOR OPERATOR SUPPORT	S-5225	5
S-52	PS1A	PIPE SADDLE WELDMENT (CAT BOM #80)	S-5228	48
S-53	---	STEEL STRAP 1/2" x 2" x 1'-2" LG, GALV STEEL (CAT BOM #215)	S-5229	242
S-54	---	3/4" DIA ROD, WITH THREADED ENDS, GALV STEEL (CAT BOM #261)	S-5229	8
S-55	---	SIGNAL POWER SWITCH PLATFORM	S-5220	13
S-56	---	SIGNAL POWER TRANSFORMER PLATFORM - SINGLE	S-5217	11
S-57	---	SIGNAL POWER TRANSFORMER PLATFORM - DOUBLE	S-5232	2
S-58	SPP	SIGNAL POWER POLE, W14X90	S-5213	3

CONTRACTOR FENCE BILL OF MATERIAL

ITEM	DESCRIPTION	DRAWINGS	QTY
S-300	PENNSWOOD RD	ET-1917	1
S-301	NARBERTH RD	ET-1917	1

SIGNAL POWER STEEL BILL OF MATERIAL

ITEM	DESCRIPTION	DRAWING	QTY
S-203	TRANSFORMER FOUNDATION		1
S-204	352 FRAME STRUCTURE WITH EQUIPMENT MOUNTING BRACKETS	S-5501, S-5503	1
S-205	352 STRUCTURE FOUNDATION, F4	S-5501, DET 2	4
S-206	CABINET FOUNDATION	S-5503, DET G	1
S-207	352 BREAKER FOUNDATION	S-5501, DET B	1

NOTES:

1. ITEMS NOT INCLUDED IN ZOO TO BRYN MAWR PORTION OF ZOO TO PAOLI PROJECT.

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OFFICE OF
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Engineering

National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
MASTER BILL OF MATERIAL
STEEL

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

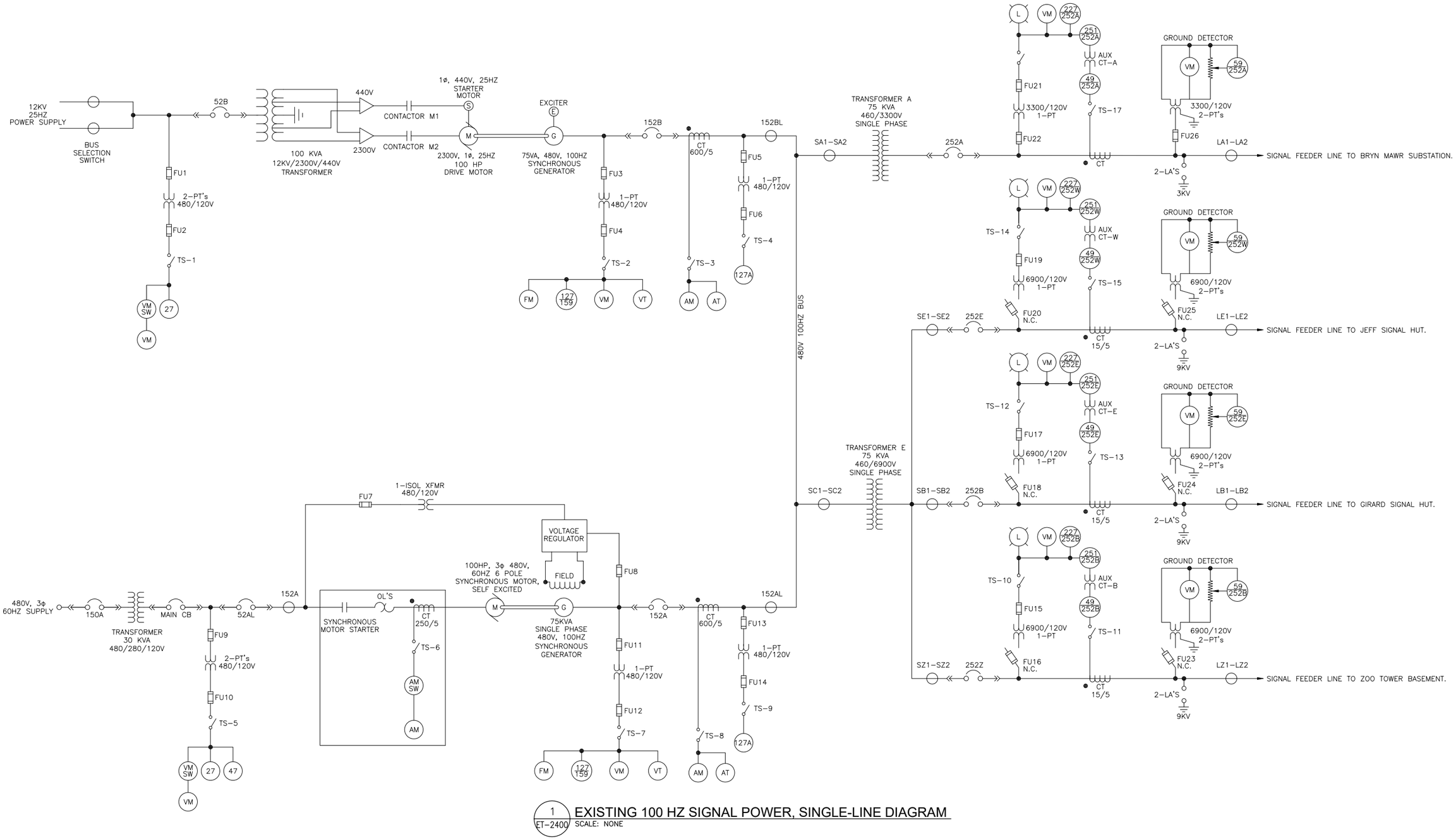
File No.:	2011-059-ET-1934.DWG
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ET-1934

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–2400 EXISTING 100 HZ SIGNAL POWER, SINGLE-LINE DIAGRAM

SCALE: NONE

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
ZOO SUBSTATION
EXISTING 100 HZ SIGNAL POWER, SINGLE–LINE DIAGRAM

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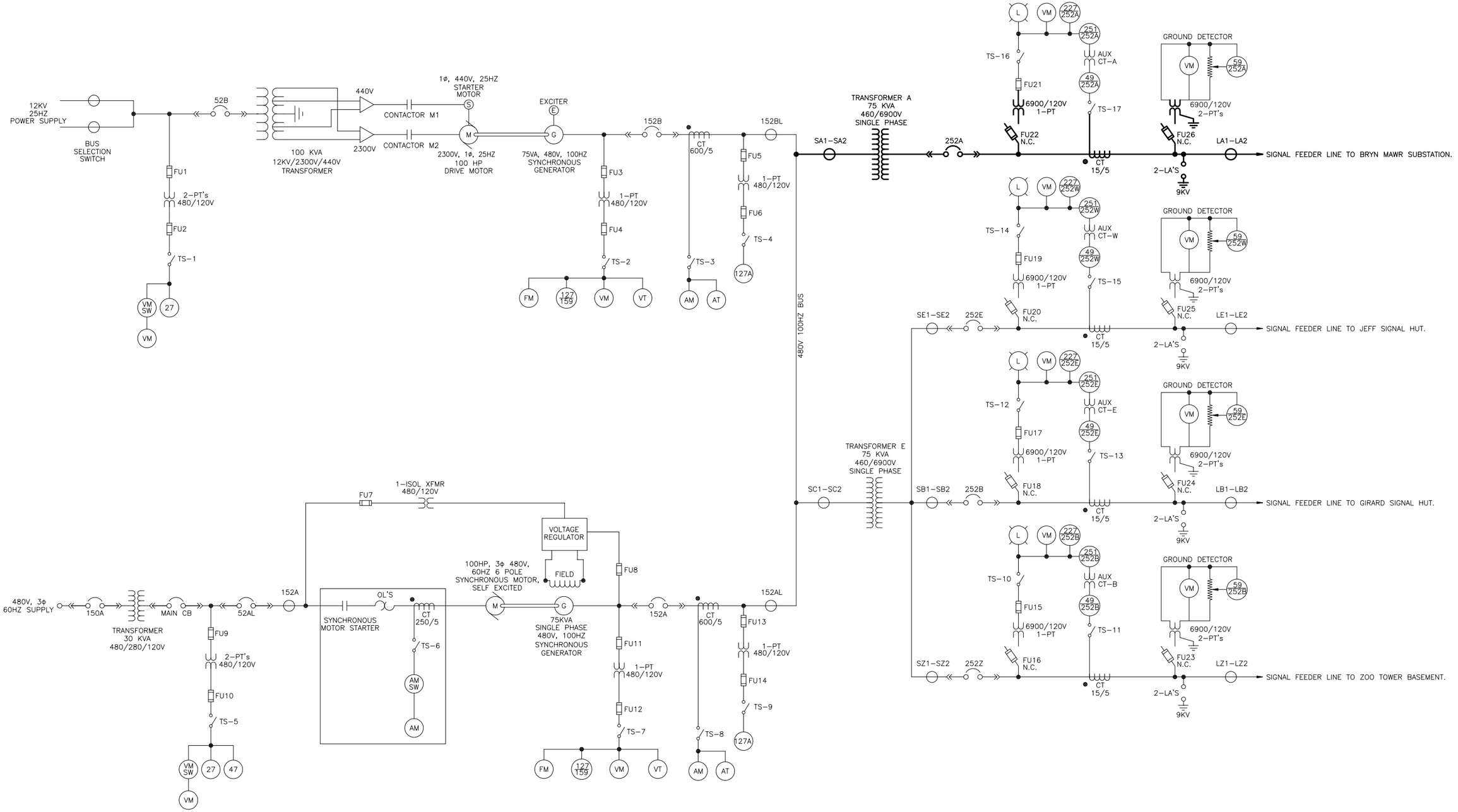
File No.:	2011–059–ET–2400.DWG
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ET–2400

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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–2401 PROPOSED 100HZ SIGNAL POWER RELAYING DIAGRAM

SCALE: NONE

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
ZOO SUBSTATION – PROPOSED
100HZ SIGNAL POWER RELAYING DIAGRAM

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ET–2401

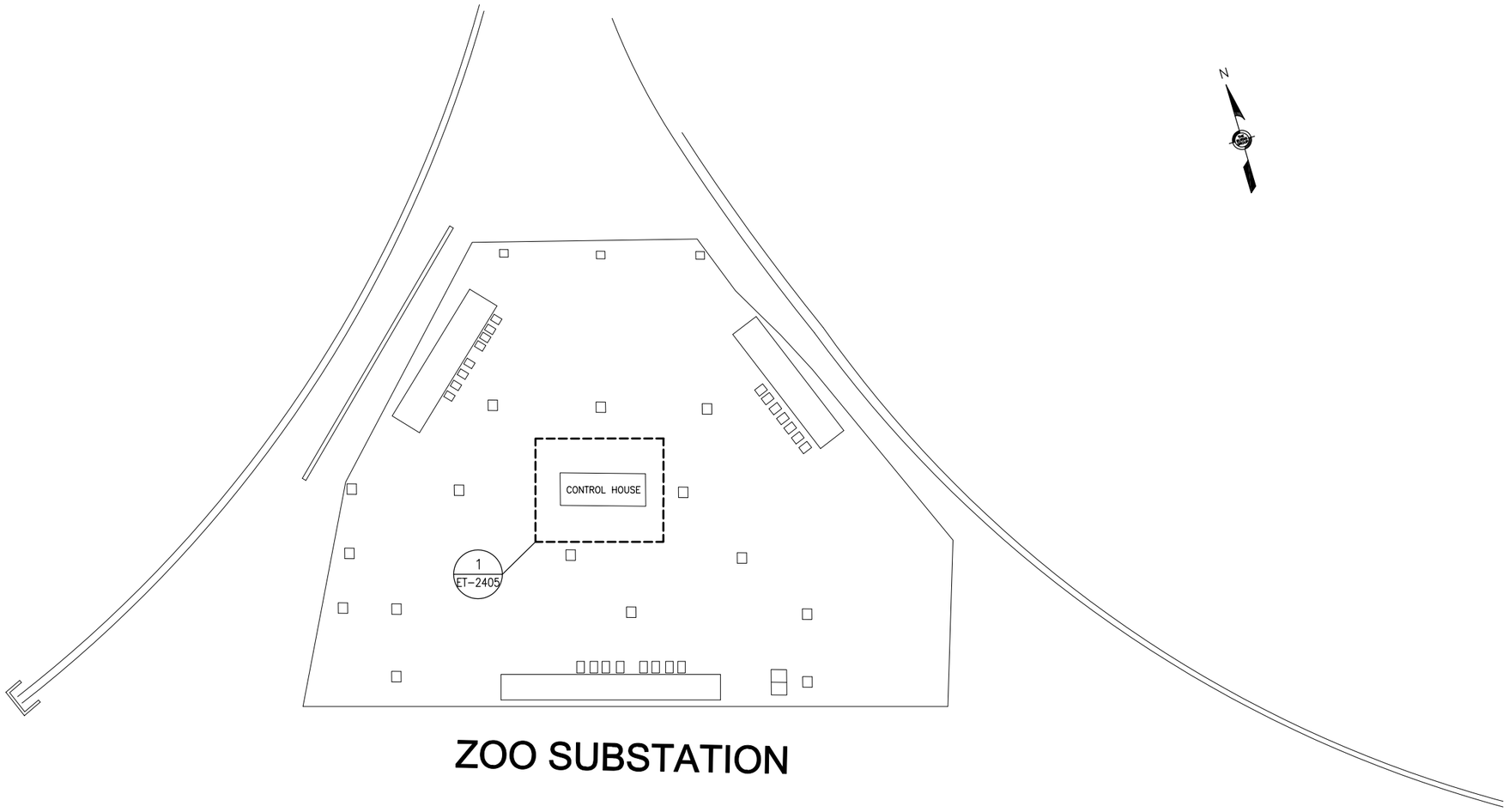
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TO HARRISBURG

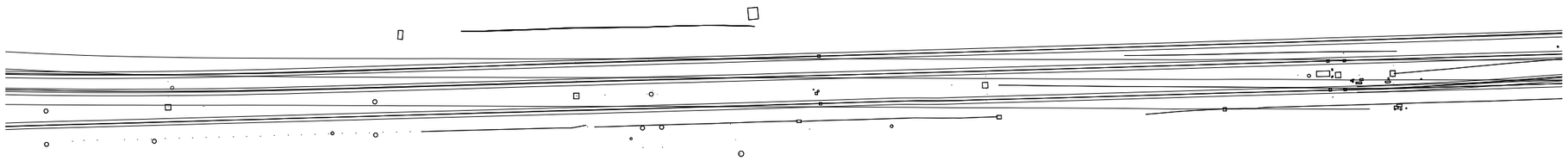
TO PHILADELPHIA

NOTES:

1. THIS DRAWING IS INTENDED TO ILLUSTRATE THE AFFECTED AREAS ONLY. FOR ADDITIONAL INFORMATION, REFER TO APPROPRIATE ZOO SUBSTATION DRAWINGS.



ZOO SUBSTATION



1 / ET-2403 ZOO SUBSTATION SITE PLAN

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AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
ZOO SUBSTATION
SITE PLAN

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Ref. No.:	2011-059
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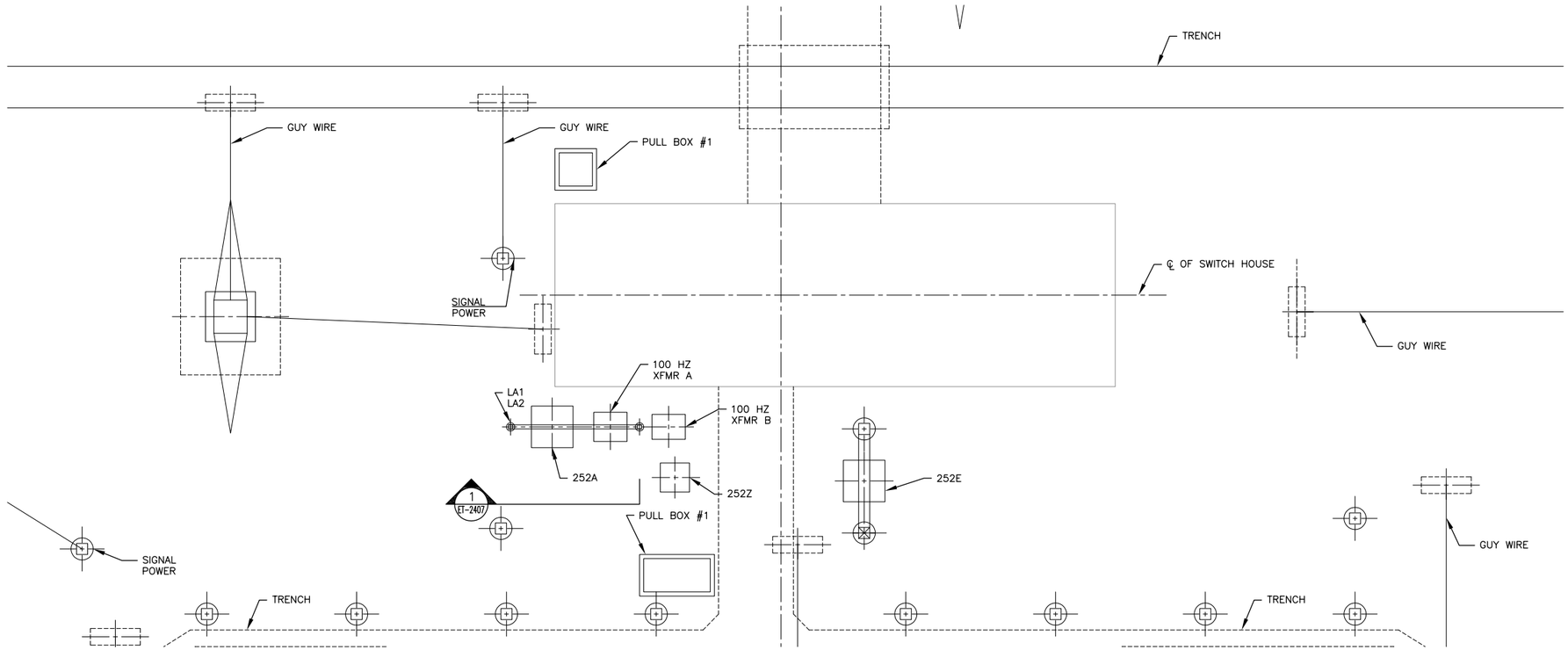
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TO PHILADELPHIA

TO HARRISBURG

N



1 ET-2405 EXISTING PARTIAL PLAN

8' 4' 0 8'

SCALE:1/8"=1'-0"

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ELECTRIFICATION
ZOO SUBSTATION
EXISTING PARTIAL PLAN

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File No.:	2011-059-ET-2405.DWG
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ET-2405

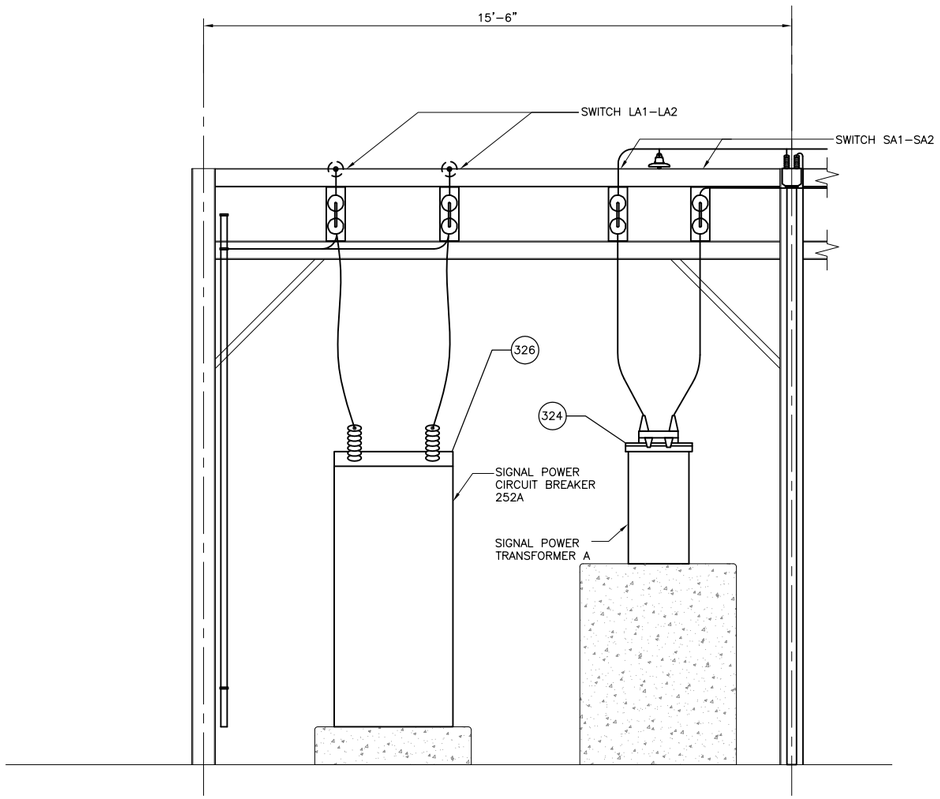
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–010.

BILL OF MATERIALS (352 BREAKER)

ID	MARK NO.	AMMES	DESCRIPTION	REF. DRAWING	UNIT	OVERBROOK
324			SIGNAL POWER TRANSFORMER, 75 KVA, 100HZ, 480V TO 6.9kV		EA	1
326			CIRCUIT BREAKER, OUTDOO, HIGH SPEED, 2-POLE, 100HZ, 15kV		EA	1



1 / ET–2407 PROPOSED 6.9KV SIGNAL POWER EQUIPMENT

2' 1' 0 2'

SCALE: 1/2"= 1'–0"

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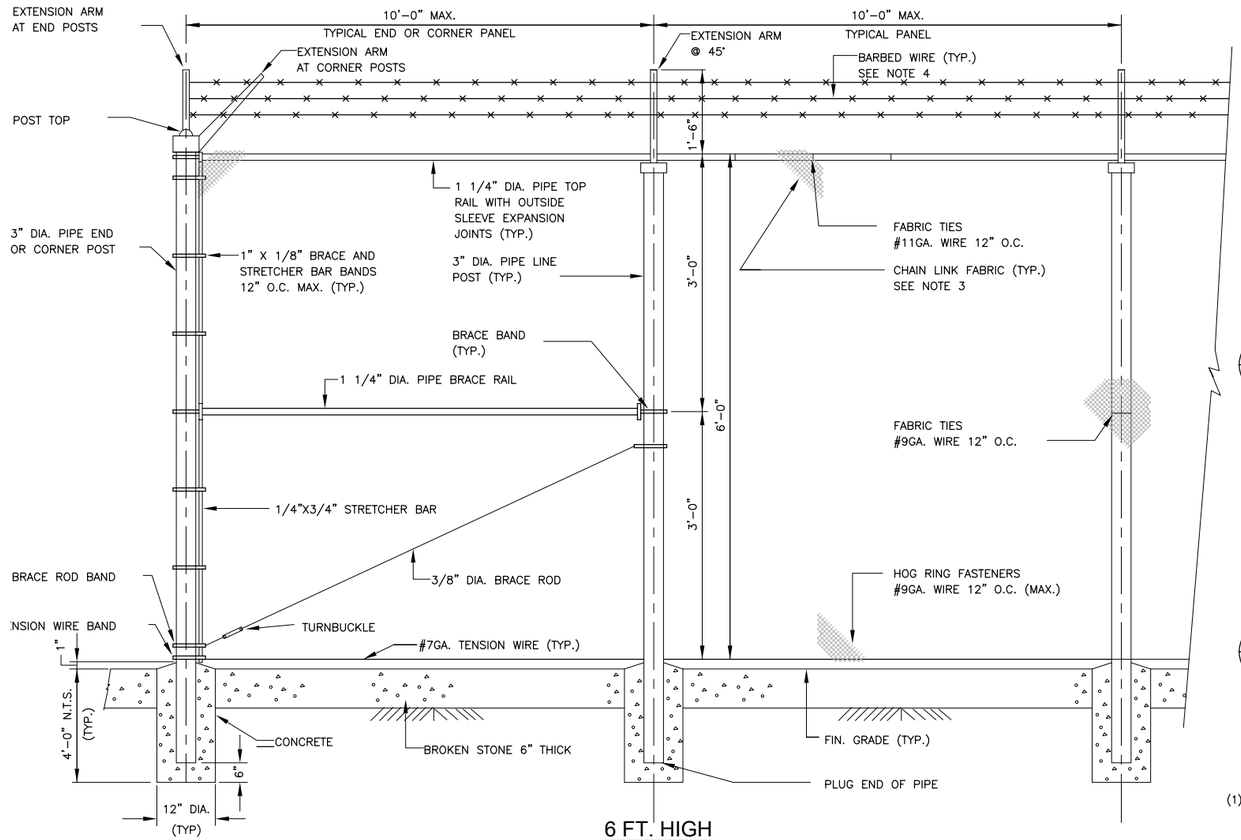
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
ZOO SUBSTATION
PROPOSED 6.9KV SIGNAL POWER EQUIPMENT

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011–059–ET–2407.DWG
Ref. No.:	2011–059
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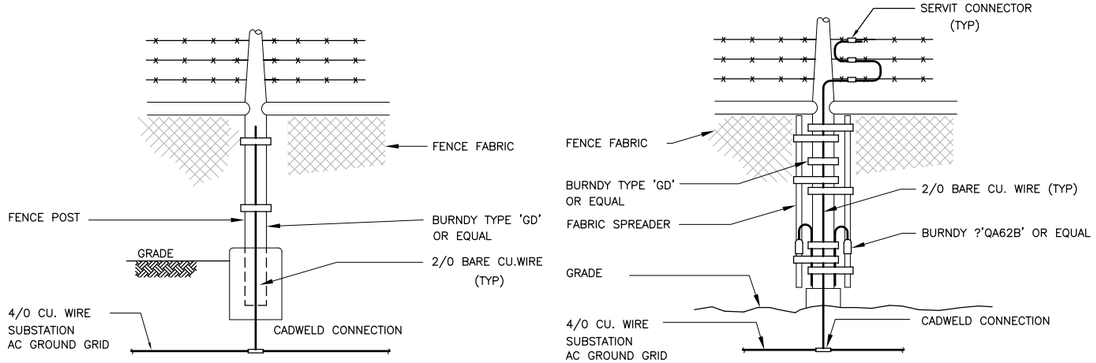
ET–2407

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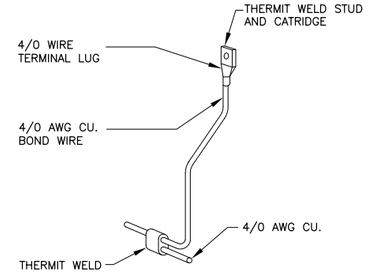
6 FT. HIGH
CHAIN LINK FENCE-BLACK VINYL COATED STEEL

1 ET-2660 — TYPICAL FENCE ELEVATION
SCALE: NONE

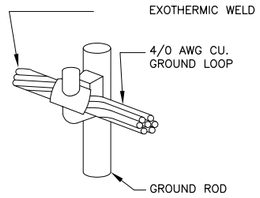


2 ET-2660 — FENCE POST GROUNDING (TYP.)
SCALE: NONE

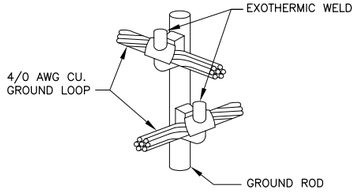
3 ET-2660 — FENCE FABRIC AND BARBED WIRE GROUNDING (TYP)
SCALE: NONE



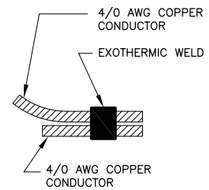
7 ET-2660 — POLE TO GROUND GRID
SCALE: NONE



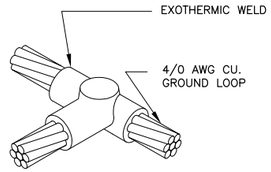
8 ET-2660 — 4/0 AWG TO GROUND ROD
SCALE: NONE



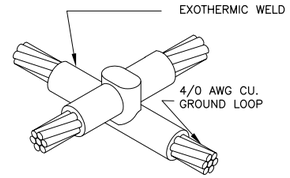
10 ET-2660 — TWO 4/0 AWG TO GROUND ROD
SCALE: NONE



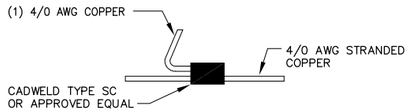
6 ET-2660 — 4/0 AWG TO 4/0 AWG
SCALE: NONE



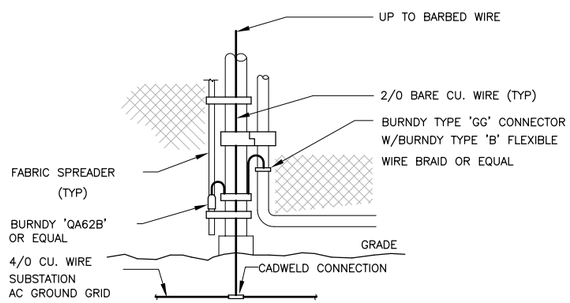
9 ET-2660 — 4/0 AWG TO 4/0 AWG
SCALE: NONE



11 ET-2660 — 4/0 AWG TO 4/0 AWG
SCALE: NONE



5 ET-2660 — 4/0 AWG TO 4/0 AWG
SCALE: NONE



4 ET-2660 — GATE GROUNDING (TYP)
SCALE: NONE

NOTES:

1. LAYOUT OF POST LOCATIONS SHALL BE PERFORMED BY THE CONTRACTOR IN ACCORDANCE WITH THE INTENT OF THE CONTRACT PLAN. ALL SUCH LAYOUTS AND DETAILS SHALL BE CHECKED AND APPROVED BY AMTRAK PRIOR TO ERECTION TO THE FENCE.
2. FOR FENCE AND GATE LOCATION SEE SITE PLANS.
3. HOT DIP GALVANIZED CHAIN – LINK FABRIC FOR GATES & FENCES FOR ALL SUBSTATIONS SHALL BE #9FGA. STEEL WIRE WOVEN IN A 1"X 1" MESH. TOP AND BOTTOM EDGES SHALL BE TWISTED AND BARBED. PROVIDE COLORED VINYL COATING ON THE CHAIN LINK FABRIC.
4. 3 LINES OF BARBED WIRE, EACH COMPOSED OF 2 TWISTED, BLACK VINYL COATED, #12GA, STEEL WIRES, WITH BARBS SPACED 5" APART, SHALL BE PROVIDED
5. ALL PIPE SIZES ARE NOMINAL: ALL PIPES ARE SCHEDULE 80 GALVANIZED STEEL EXCEPT AS OTHERWISE STATED IN THE SPECIFICATIONS. ALL STEEL FOR TIES, BRACES, BANDS, FASTENERS, EXTENSION ARMS, ETC SHALL BE GALVANIZED AND BLACK VINYL COATED.
6. CHAIN–LINK FENCE TO CONFORM TO THE CURRENT AASHTO SPECIFICATIONS, DESIGNATION M181
7. TEMPORARY FENCE ARRANGMENTS DURING CONSTRUCTION SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST.
8. ALL STEEL COMPONENTS AND PARTS SHALL BE HOT DIP GALVANIZED.
9. "DANGER – HIGH VOLTAGE" WARNING SIGNS SHALL BE PROVIDED ON ALL THE FOUR SIDES OF THE FENCE.

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OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns — BURNS ENGINEERING, INC. | 215 979-7700 | TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400 | PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
GENERAL DETAILS
FENCE GROUNDING DETAILS

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

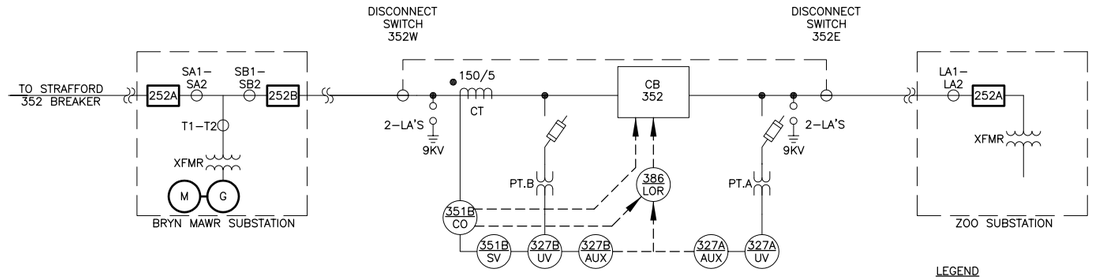
File No.:	2011-059-ET-2660.DWG
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. 100 HZ SIGNAL POWER TRANSMISSION SHALL BE SECTIONALIZED BY CIRCUIT BREAKERS (252A AND 252B) AT EACH SUBSTATION AND AT EACH INTERMEDIATE POINT WITH CIRCUIT BREAKER (352).
3. UNDER NORMAL CONDITIONS CIRCUIT BREAKER (352) IS OPEN. WHENEVER A SECTION OF MAIN TRANSMISSION IS DE–ENERGIZED, CIRCUIT BREAKER (352) SHALL AUTOMATICALLY CLOSE, UNLESS A FAULTED CONDITION EXISTS ON A SECTION OF LINE, IN WHICH CASE OVER–CURRENT RELAY 51 SHALL OPEN THE BREAKER.
4. 252A (252B) AND 352 SHALL BE PROPERLY COORDINATED TO AVOID FALSE TRIPS. 252A AND 252B TRIP DELAY SHALL BE LONGER THAN 352 TRIP.
5. SCADA SHALL PROVIDE THE POWER DIRECTOR WITH DISCRETIONARY CONTROL OF ALL APPARATUS AT ALL TIMES, IN ADDITION TO REMOTE AUTOMATIC CONTROL.



LEGEND

M	MOTOR
G	GENERATOR
CB	CIRCUIT BREAKER
CO	TIME OVER–CURRENT RELAY
SV	INSTANTANEOUS ADJUSTABLE VOLTAGE RELAY
UV	UNDER–VOLTAGE RELAY
AUX	AUXILIARY RELAY
LOR	LOCKOUT AND RESET RELAY
XFMR	TRANSFORMER

SCENARIOS	OPERATION STATUS/SEQUENCE
#1 NORMAL	CB 352 OPEN CB 252A, 252B, CLOSED LINE 1 ENERGIZED BY BRYN MAWR LINE 2 ENERGIZED BY ZOO
#2 LINE FAULT (USING LINE 1 FAULT AS EXAMPLE)	1 LINE 1 FAULT 2 252B TRIP (351–CO PICKS UP) LINE 1 DE–ENERGIZED 3 352 CLOSE (327B–UV PICKS UP) LINE 1 ENERGIZED BY ZOO 4 352 TRIP (351B–CO PICKS UP DUE TO LINE 1 FAULT) AND LOCKED OUT BY 386–LOR LINE 1 DE–ENERGIZED LINE 2 REMAINS ENERGIZED BY ZOO
#3 ONE GENERATOR OUT OF SERVICE WITHOUT LINE FAULT	1 BRYN MAWR OUT OF SERVICE 2 252B TRIP (227–UV PICKS UP) LINE 1 DE–ENERGIZED 3 352 CLOSE (327–UV PICKS UP) LINE 1 ENERGIZED BY ZOO LINE 2 ENERGIZED BY ZOO

#	BREAKER	FROM SUB	TO SUB	LOCATION NAME	CONNECTION TYPE	SITE PLAN DWG.
3	352	BRYN MAWR (SUB 3)	ZOO (SUB 9)	OVERBROOK	CABLE	ET-3201

2 / ET–3200 352 BREAKER LOCATION & CONNECTION TYPE
SCALE: NONE

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BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

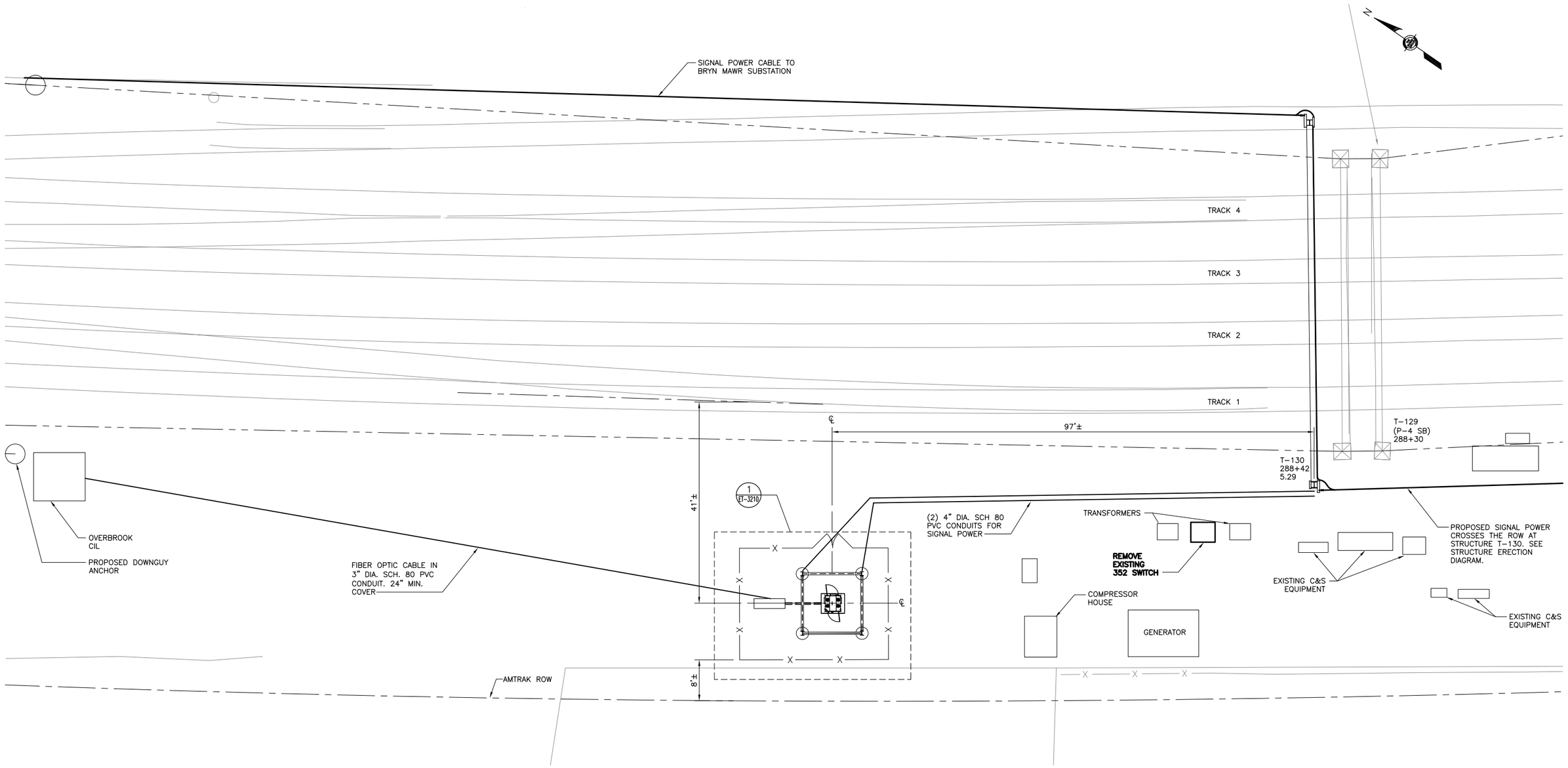
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
GENERAL NOTES AND TRIPPING SEQUENCE

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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PROPOSED 352 BREAKER INSTALLATION AT OVERBROOK – STA 289+39

0 10 20

SCALE: 1"=10'–0"

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR OVERALL 100HZ STAGING PLANS SEE DRAWINGS ET–0050 THROUGH ET–0052.
3. REMOVE EXISTING 352 SWITCH JUST WEST OF OVERBROOK CIL. COORDINATE WITH AMTRAK.

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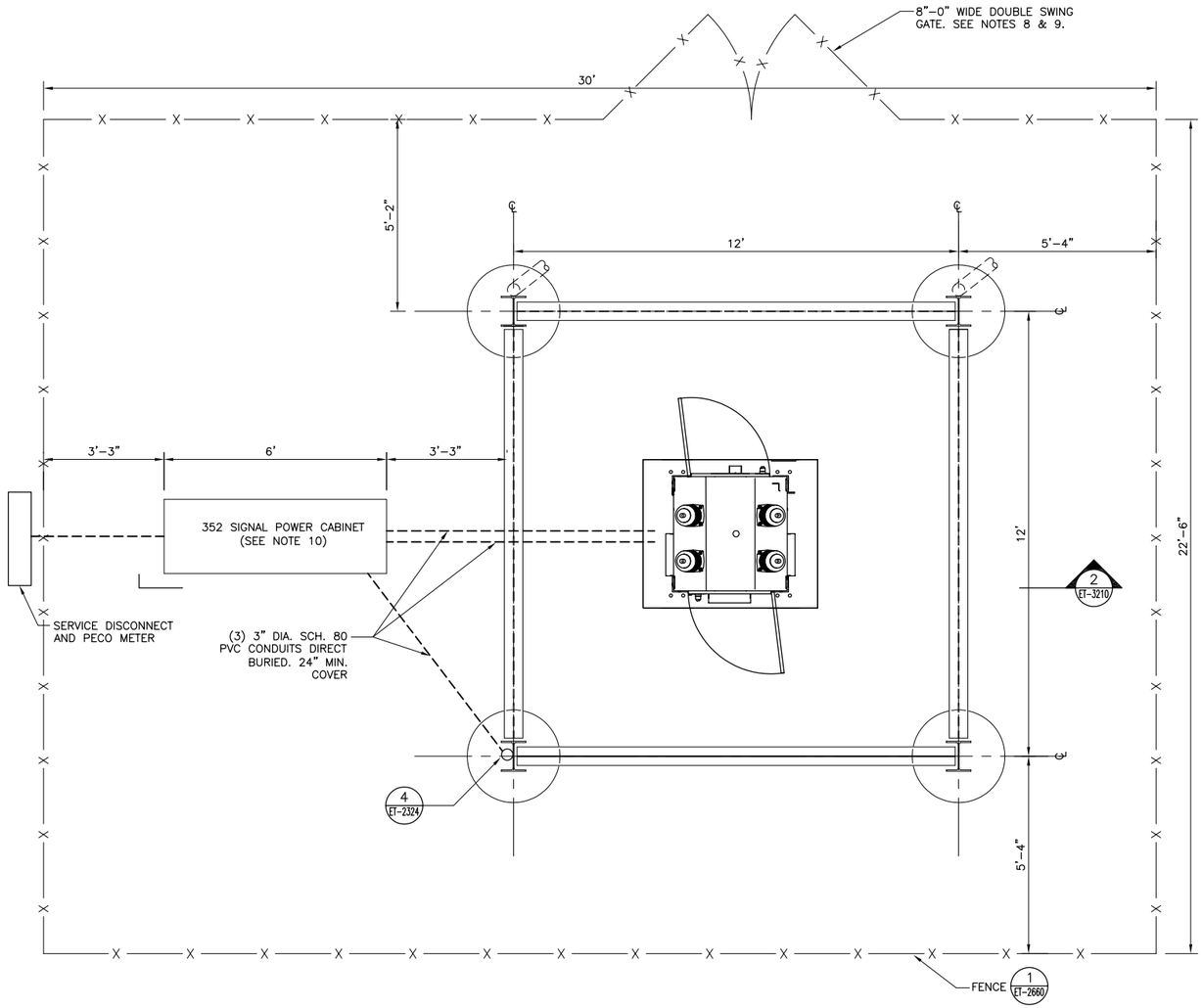
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
OVERBROOK PLAN – PROPOSED INSTALLATION

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

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ET–3201

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1 ET–3210 **352 SIGNAL POWER STRUCTURE SITE PLAN**

2' 1' 0 2'

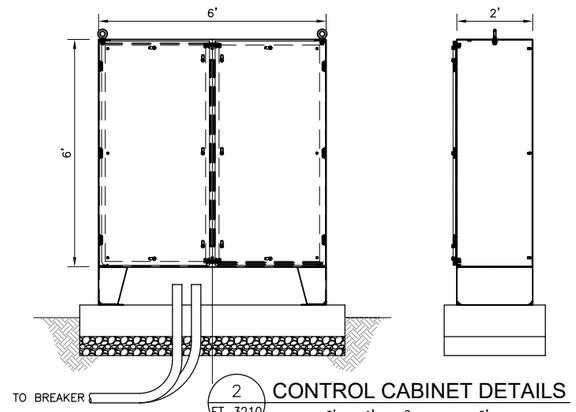
SCALE: 1/2"= 1'–0"

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. CONTRACTOR SHALL PROVIDE DIRECT STROKE LIGHTNING PROTECTION FOR ALL APPARATUS AND LINES UNLESS PROTECTION IS PROVIDED BY THE CATENARY STRUCTURES ALONG THE RIGHT–OF–WAY.
3. LIGHTNING ARRESTERS SHALL BE LOCATED ON EACH OUTGOING FEEDER, ON BOTH SIDES OF THE CIRCUIT BREAKER (352).
4. CONTROL CABINET SHALL HOUSE RELAYS, BATTERY, CHARGER AND REMOTE TERMINAL UNIT (RTU).
5. FINAL CONTROL CABINET DESIGN WILL BE PROVIDED ON SUBSEQUENT SUBMISSION UPON COORDINATION WITH AMTRAK C&S DEPARTMENT.
6. SEE DRAWINGS ET–3211 AND ET–3212 FOR LAYOUT OF ELECTRICAL EQUIPMENT.
7. SEE DRAWING S–5501 FOR STRUCTURAL DETAILS.
8. LOCATE GATE IN FENCE TO ALLOW FOR CONVENIENT ACCESS.
9. CONTRACTOR SHALL PROVIDE LOCKING MECHANISM FOR GATE. COORDINATE KEYING WITH AMTRAK.
10. CONTRACTOR SHALL COORDINATE WITH UTILITY TO PROVIDE 120VAC SINGLE PHASE ELECTRICAL SERVICE FOR CONTROL CABINET. A SEPARATE AC POWER PANEL MAY BE INSTALLED INSIDE CONTROL CABINET TO PROVIDE LOW VOLTAGE AC POWER FOR BATTERY CHARGER, CABINET LIGHT, CONVENIENT OUTLET AND HEATER.

BILL OF MATERIALS (352 BREAKER)

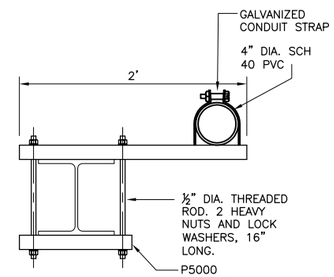
ID	MARK NO.	AMMES	DESCRIPTION	REF. DRAWING	UNIT	OVERBROOK
222			COLD SHRINK TERMINATION, 3M 5513A		EA	4
320			TRANSFORMER, POTENTIAL, OIL-IMMERSED, 100Hz, 6.9kV/120V		EA	2
323			LIGHTNING ARRESTOR, 1-POLE, 9kV		EA	4
325			DISCONNECT SWITCH, 15kV, 2 POLE, 600 AMP, AND OPERATOR		EA	4
326			CIRCUIT BREAKER, OUTDOOR, HIGH-SPEED, 2-POLE, 100Hz, 15kV@ (SIG PWR)		EA	1
339			4" DIA SCH. 80 PVC CONDUIT		LF	210
340			3" DIA SCH. 80 PVC CONDUIT		LF	150
365			CURRENT TRANSFORMER, 25 KV, 100 HZ, BB-25-973, ABB		EA	1
366			FUSED DISCONNECT, 7.8 KV EU, 100A WITH MOUNTING BRACKET, ABB		EA	4
368			12 STRAND FIBER OPTIC CABLE		LF	150



2 ET–3210 **CONTROL CABINET DETAILS**

2' 1' 0 2'

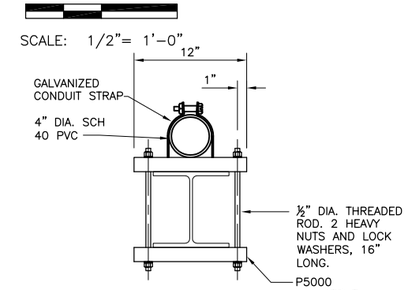
SCALE: 1/2"= 1'–0"



3 ET–3210 **CONDUIT CONNECTION**

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"



4 ET–3210 **CONDUIT CONNECTION**

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
CIRCUIT BREAKER 352 AND CONTROL CABINET

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

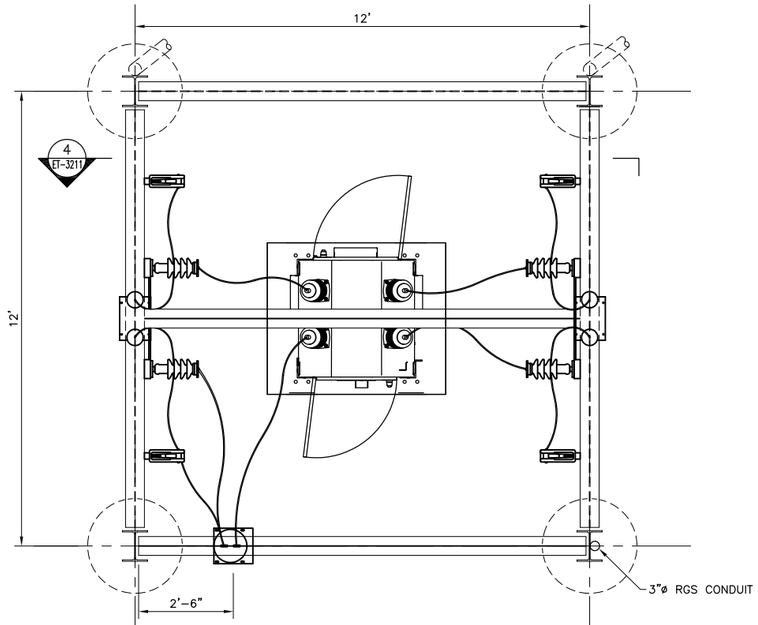
File No.:	2011-059-ET-3210.DWG
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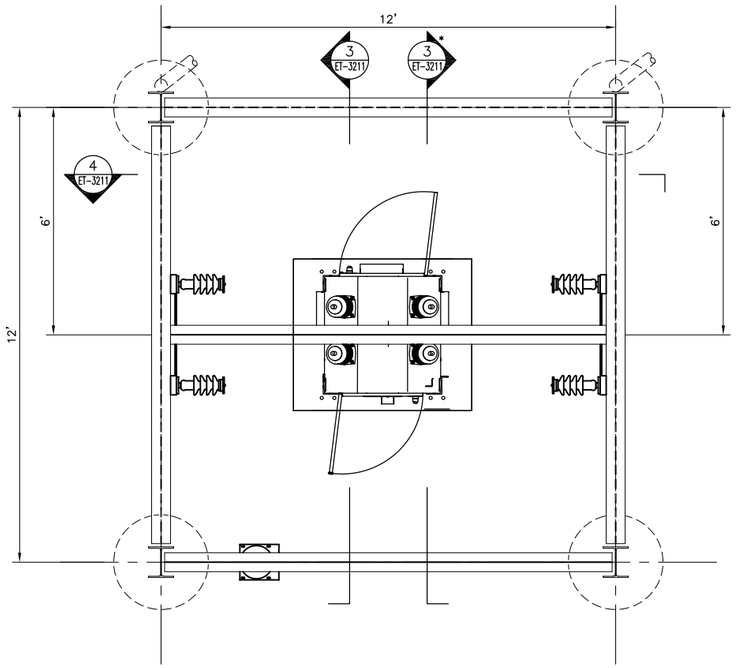
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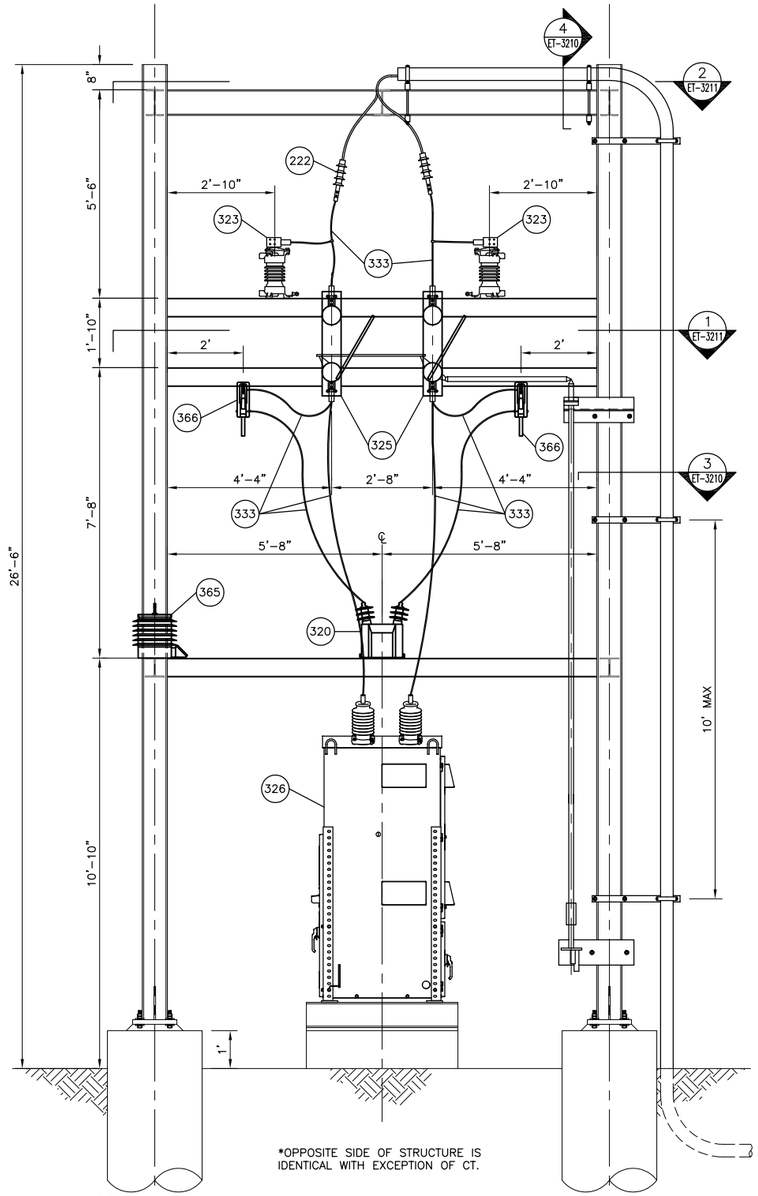
1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.
2. FOR 352 BREAKER INSTALLATION PLANS, SECTIONS AND DETAILS SEE DRAWING S–5501.
3. FOR EQUIPMENT MOUNTING DETAILS SEE DRAWING S–5503.
4. FOR BOM FOR THE 352 BREAKER LOCATION, SEE DRAWING ET–3210.



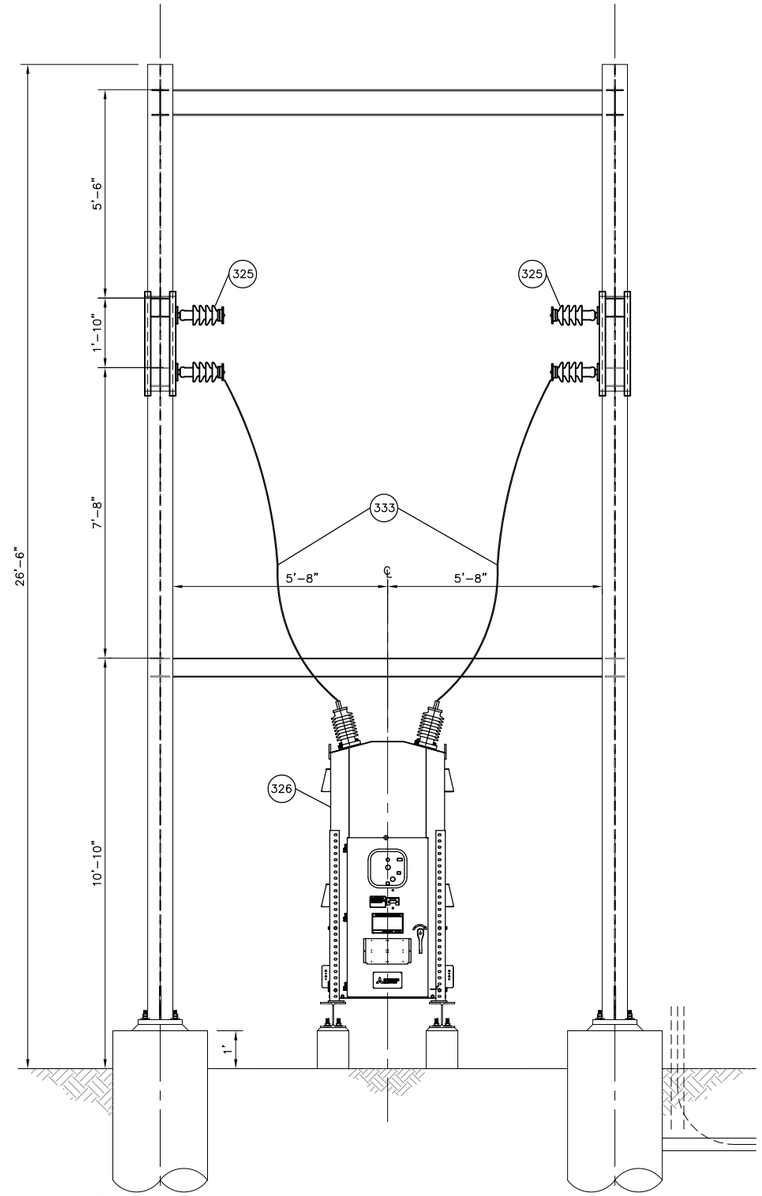
1 / ET–3211 — 352 BREAKER SIGNAL POWER STRUCTURE PLAN - MID LEVEL
SCALE: 1/2" = 1'–0"



2 / ET–3211 — 352 BREAKER SIGNAL POWER STRUCTURE PLAN - TOP LEVEL
SCALE: 1/2" = 1'–0"



3 / ET–3211 — 352 BREAKER SIGNAL POWER STRUCTURE - SECTION
SCALE: 1/2" = 1'–0"



4 / ET–3211 — 352 BREAKER SIGNAL POWER STRUCTURE - SECTION
SCALE: 1/2" = 1'–0"

2' 1' 0 2'

SCALE: 1/2"= 1'–0"

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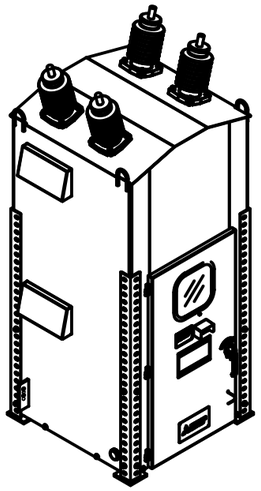
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
OVERBROOK – SIGNAL POWER STRUCTURE PLAN & SECTION

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

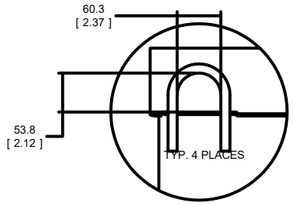
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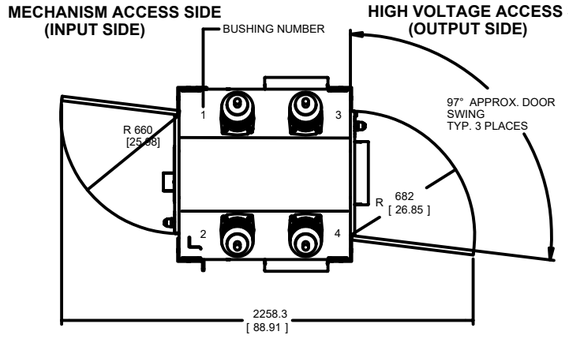
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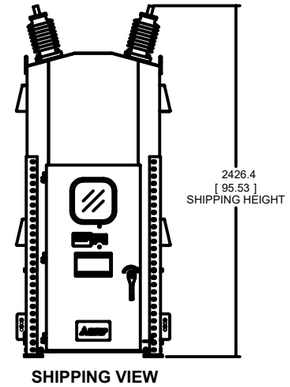
FRONT ISOMETRIC



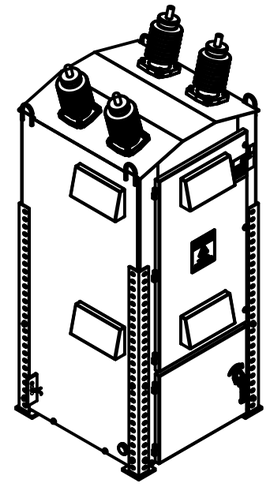
DETAIL G



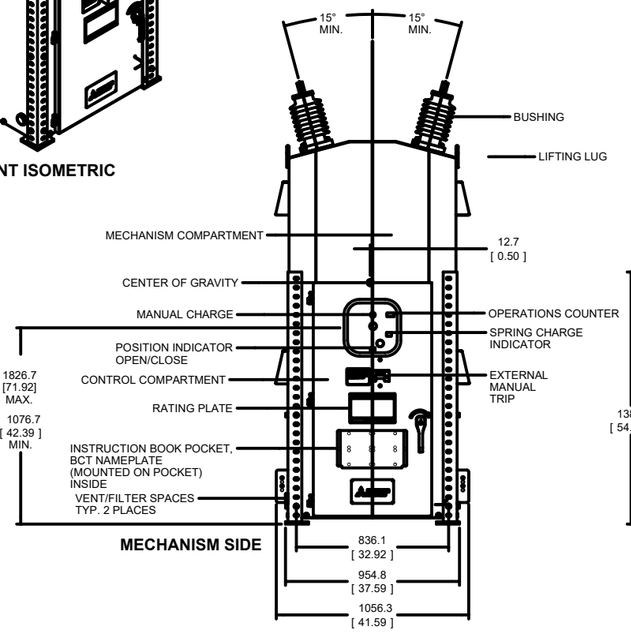
SEE NOTE 8



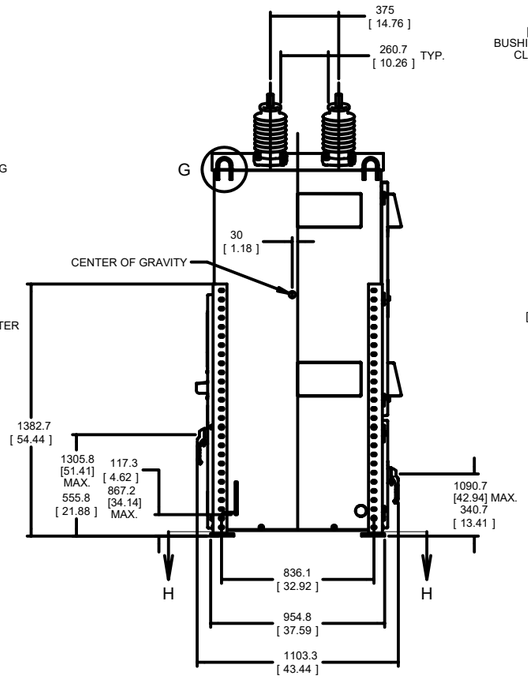
SHIPPING VIEW

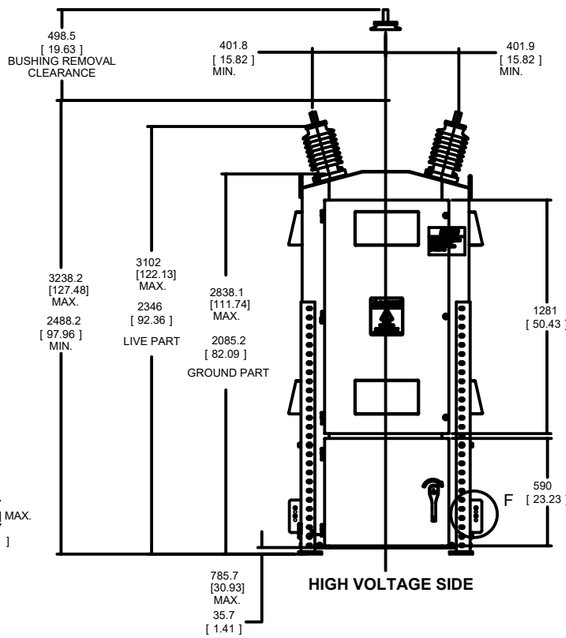


REAR ISOMETRIC

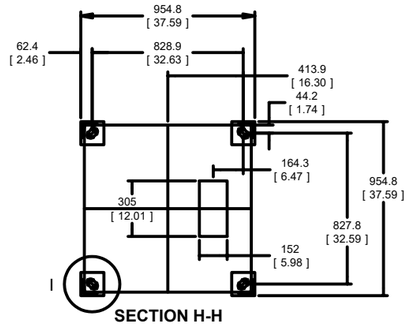


MECHANISM SIDE

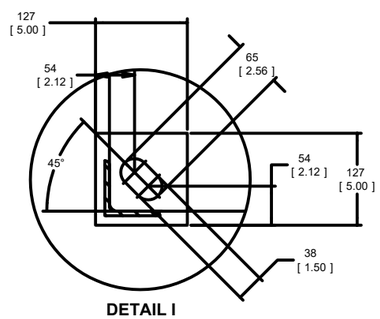




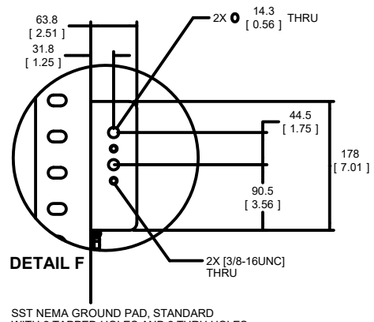
HIGH VOLTAGE SIDE



SECTION H-H



DETAIL I



DETAIL F

SST NEMA GROUND PAD, STANDARD
WITH 2 TAPPED HOLES AND 2 THRU HOLES

NOTES:

1. **DESIGN RATINGS AT 60 Hz (SEE NOTE 9 FOR 100 Hz RATINGS):**

RATED MAXIMUM VOLTAGE	17 kV
RATED CONTINUOUS CURRENT	1200A
RATED SHORT CIRCUIT CURRENT	25 kA
RATED DRY WITHSTAND VOLTAGE (60 Hz)	50 kV
RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE (PEAK)	110 kV

2. **WEIGHT:**

TOTAL & SHIPPING WEIGHT (APPROX.)	998 kg [2200 lb]

3. **INSULATOR:**

TYPE	PORCELAIN
MINIMUM CREEPAGE DISTANCE ALONG SURFACE	640 [25.2"]

4. **SURFACE TEATMENT:**

SUPPORT STRUCTURE	HOT DIPPED GALVANIZED
HOUSING	PAINT ANSI 70 LIGHT GRAY INSIDE AND OUTSIDE

5. **DYNAMIC LOADING:**

HORIZONTAL – (ACTING ALONG TANK CENTER LINE)	0.33kN [74/lb]
VERTICAL UP – (ACTING THROUGH CG)	1.62kN [385/lb]
VERTICAL DOWN – (ACTING THROUGH CG)	2.10kN [472/lb]

VERTICAL FORCES ADD TO OR SUBTRACT FROM BREAKER WEIGHT.

6. **INSTALLATION NOTE:**
LEVEL THE BREAKER BY INSERTING SHIMS BETWEEN THE BREAKER STRUCTURE AND THE FOUNDATION.

7. **HEIGHT DIMENSIONS:**
INCREMENTALLY CHANGE BY 50mm (1.96 in) RELATIVE TO LEG ADJUSTMENT.

8. **INPUT AND OUTPUT SIDES**
DESIGNATIONS BASED ON INPUT BEING CONNECTED TO STATIONARY CONTACT SIDE OF INTERRUPTER AND OUTPUT BEING CONNECTED TO MOVING CONTACT SIDE OF INTERRUPTER.

9. **MAXIMUM RATINGS AT 100 Hz:**

RATED MAXIMUM VOLTAGE	7 kV
RATED CONTINUOUS CURRENT	1200 A
RATED SHORT CIRCUIT CURRENT	1 kA
RATED DRY WITHSTAND VOLTAGE (100 Hz)	36 kV
RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE (PEAK)	110 kV

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–010.

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
352 BREAKER DETAIL

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

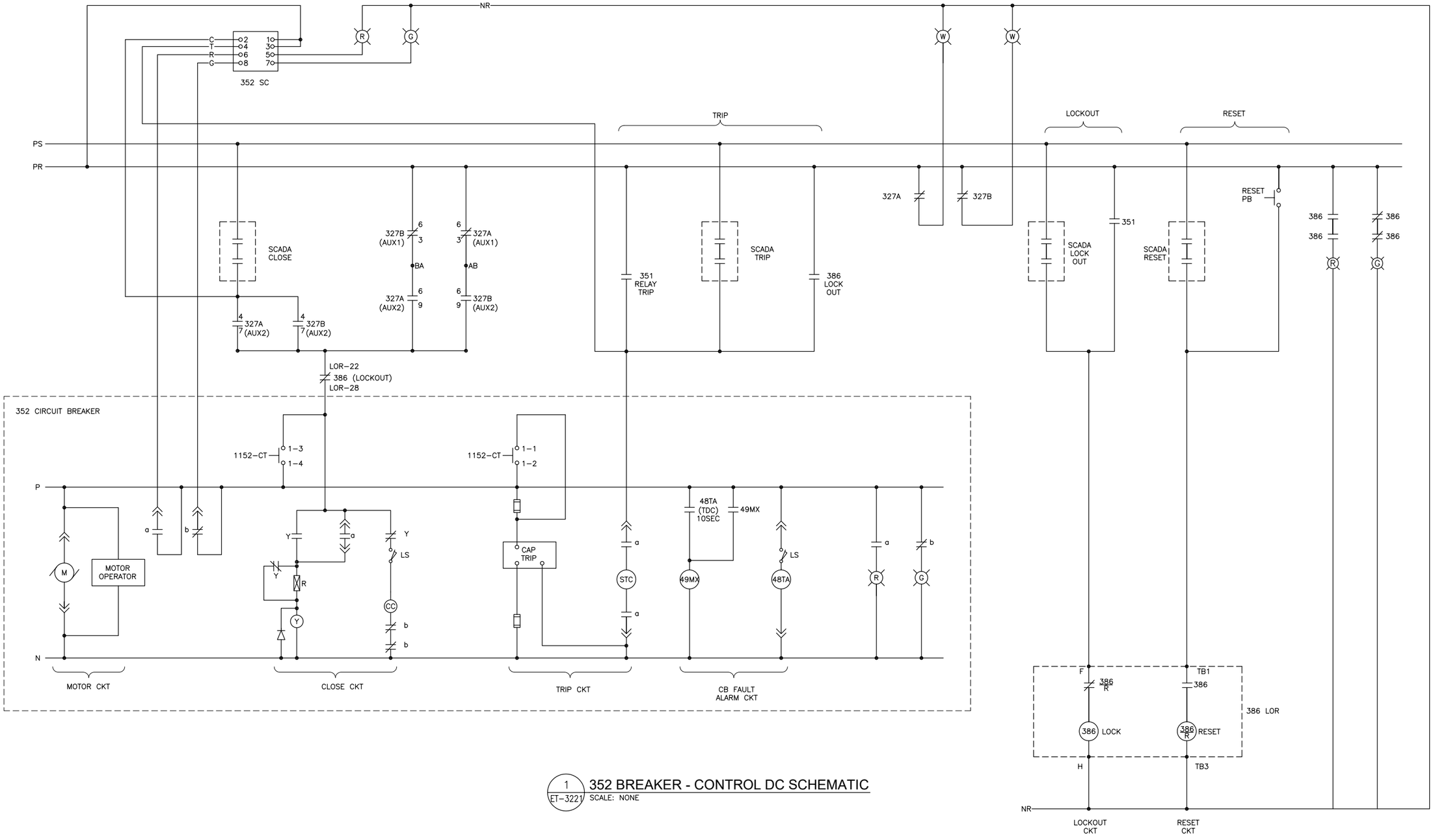
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NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–3221 352 BREAKER - CONTROL DC SCHEMATIC

SCALE: NONE

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
352 BREAKER INSTALLATION
352 BREAKER – CONTROL DC SCHEMATIC

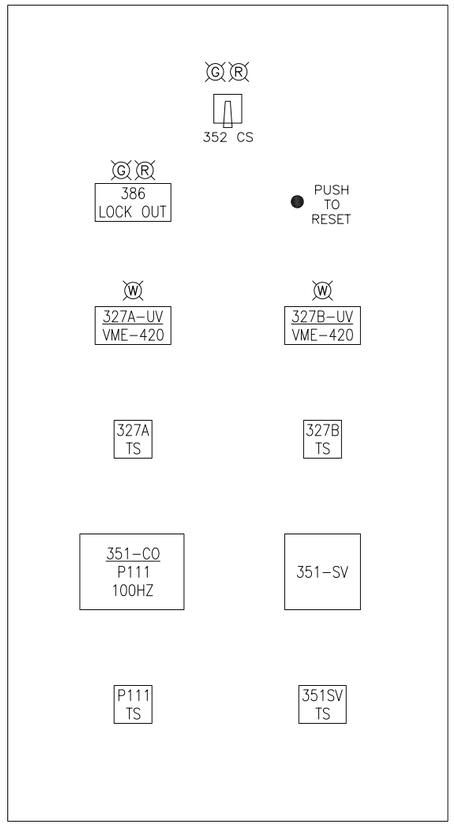
File No.:	2011–059–ET–3221.DWG
Ref. No.:	2011–059
Sheet No:	264 OF 347

ET–3221

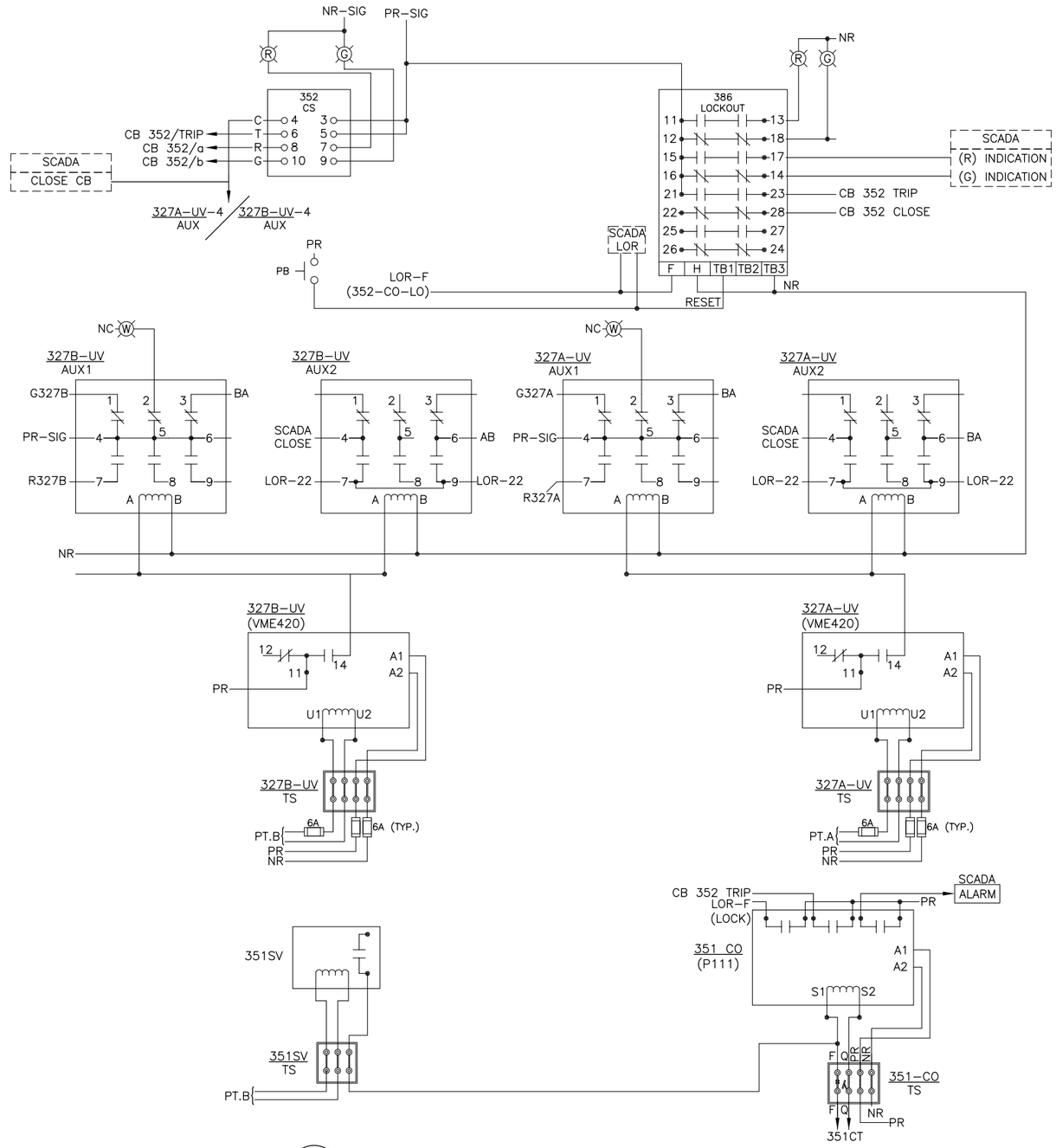
Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 ET–3222 — 352 SIGNAL CONTROL PANEL - FRONT VIEW
N.T.S.



2 ET–3222 — 352 SIGNAL CONTROL PANEL WIRING - BACK VIEW
N.T.S.

327B–UV AUX1

1 – G327B
2 – W327B
3 – BA
4 – PR–SIG
5 – PR–SIG
6 – PR–SIGN
7 – R327B

327B–UV AUX2

4 – SCADA CLOSE/352SC–C
6 – AB
7 – LOR–22
9 – LOR–22

327A–UV AUX1

1 – G327A
2 – W327A
3 – AB
4 – PR–SIG
5 – PR–SIG
6 – PR–SIGN
7 – R327A

327A–UV AUX2

4 – SCADA CLOSE/352SC–C
6 – BA
7 – LOR–22
9 – LOR–22

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
SIGNAL CONTROL PANEL AND WIRING

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

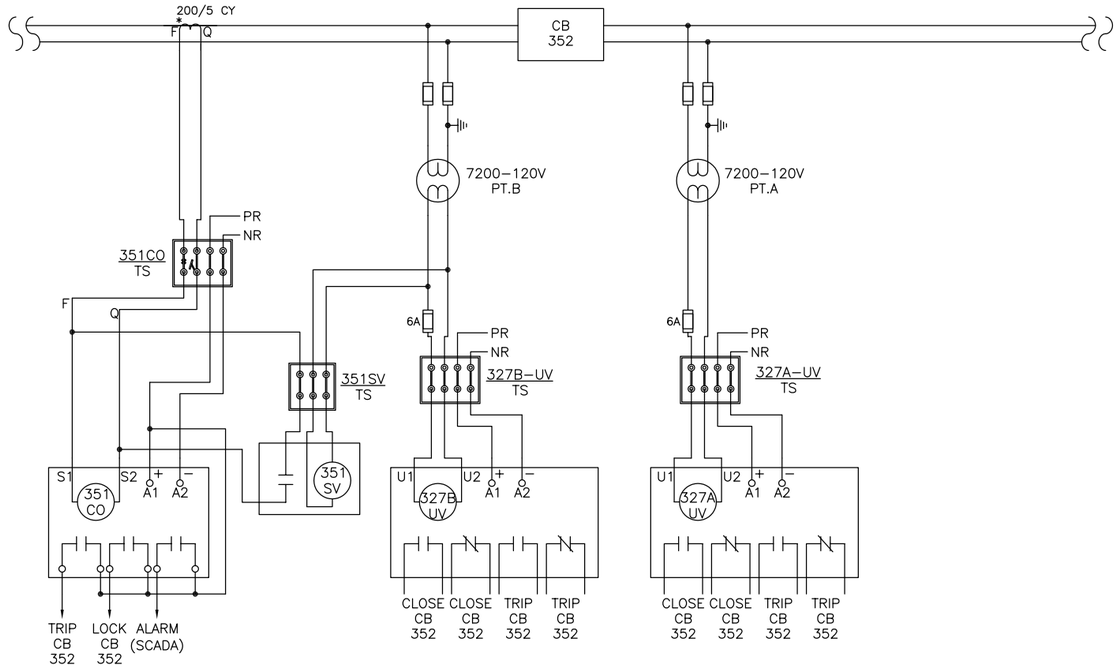
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Ref. No.:	2011–059
Sheet No:	265 OF 347

ET–3222

3/14/2016 4:13:29 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn maw\electrical\substation\2011-059-ET-3221.dwg

NOTES:

1. FOR GENERAL NOTES, LEGEND AND ABBREVIATIONS SEE DRAWING ET–0012.



1 / ET–3223 100HZ 352 CIRCUIT BREAKER AC SCHEMATIC

SCALE: NONE

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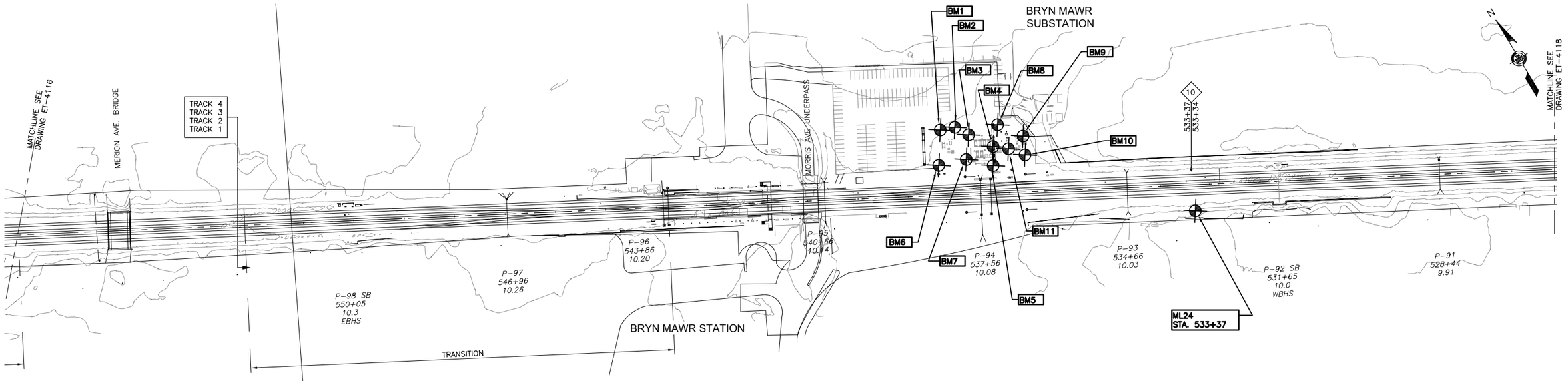
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
352 BREAKER INSTALLATION
100HZ 352 CIRCUIT BREAKER AC SCHEMATIC

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-3221.DWG
Ref. No.:	2011–059
Sheet No:	266 OF 347

ET–3223

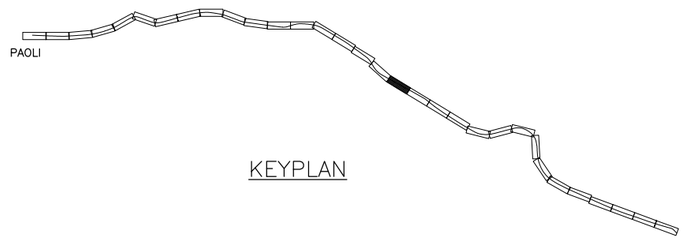
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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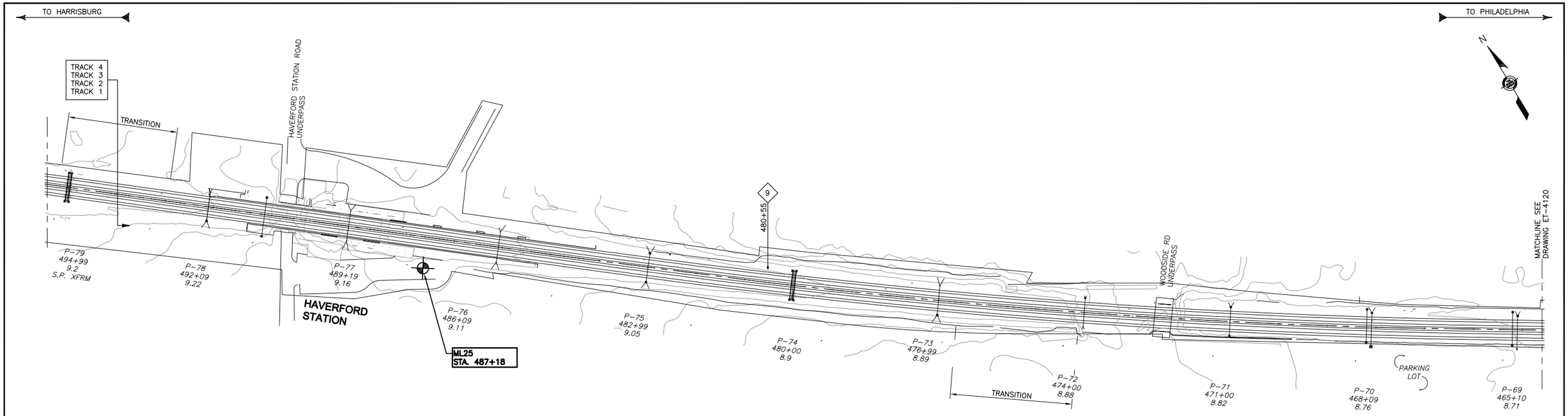
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA 556+65 TO 526+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4117.DWG
Ref. No.:	2011-059
Sheet No:	267 OF 347

ET-4117

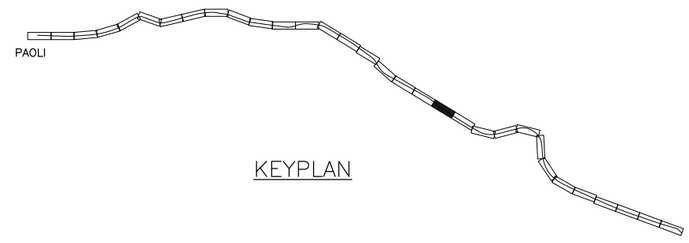
3/15/2016 7:47:31 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4117.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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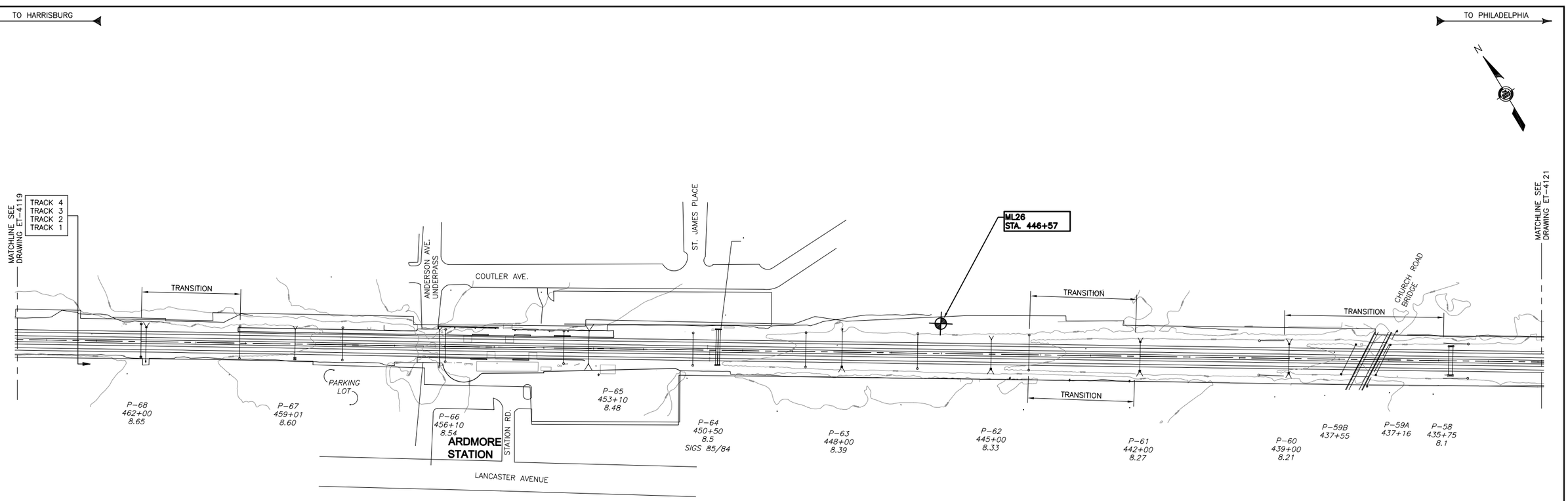
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
BORING LOCATION PLAN
STA. 495+50 TO 465+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4119.DWG
Ref. No.:	2011-059
Sheet No:	268 OF 347

ET-4119

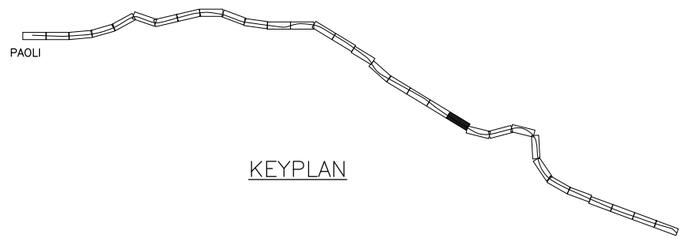
3/15/2016 7:47:40 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4119.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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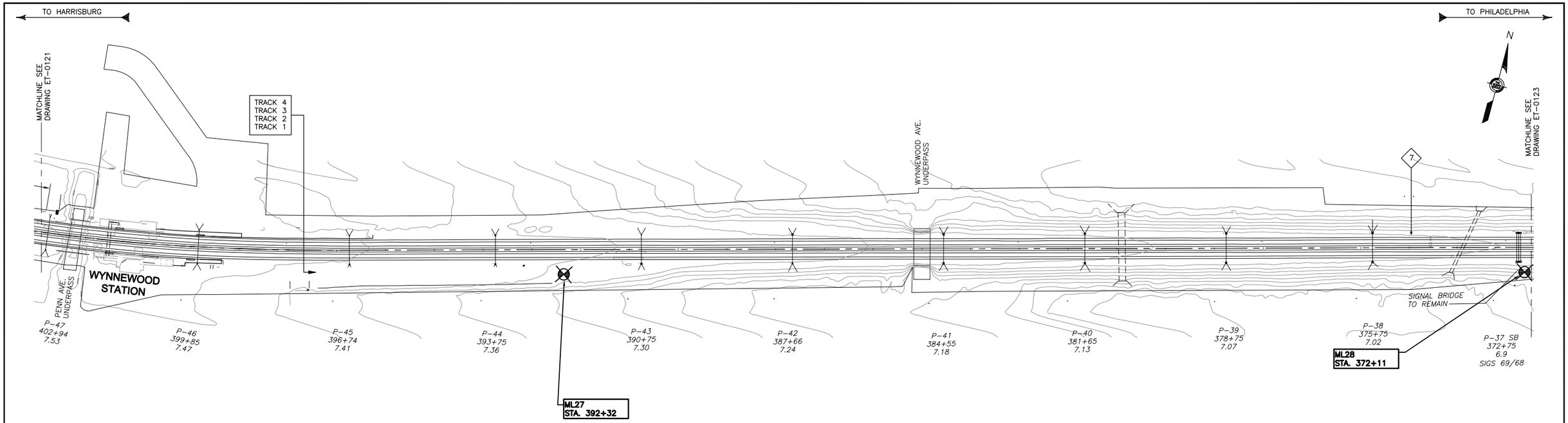
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 465+00 TO 434+00

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-4120.DWG
Ref. No.:	2011-059
Sheet No:	269 OF 347

ET-4120

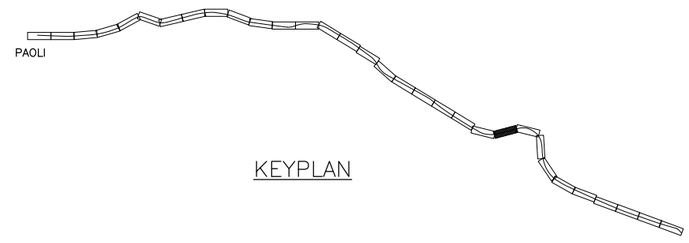
3/15/2016 7:47:49 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4120.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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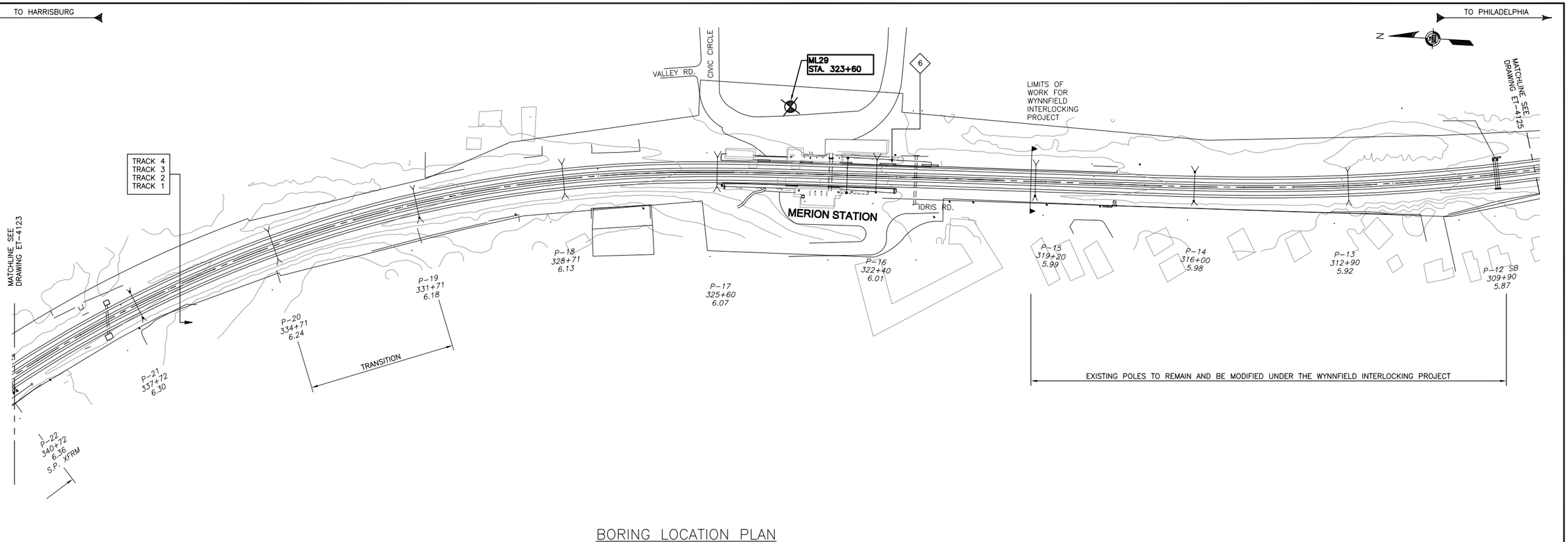
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 403+00 TO 372+50

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-ET-4122.DWG
Ref. No.:	2011-059
Sheet No:	270 OF 347

ET-4122

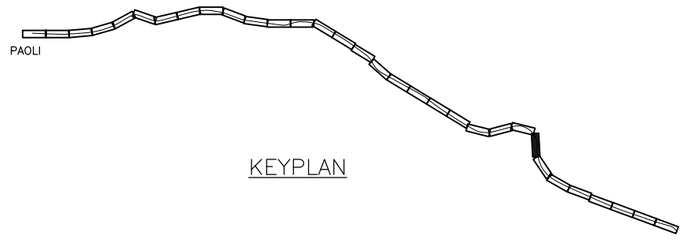
3/15/2016 7:48:14 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4122.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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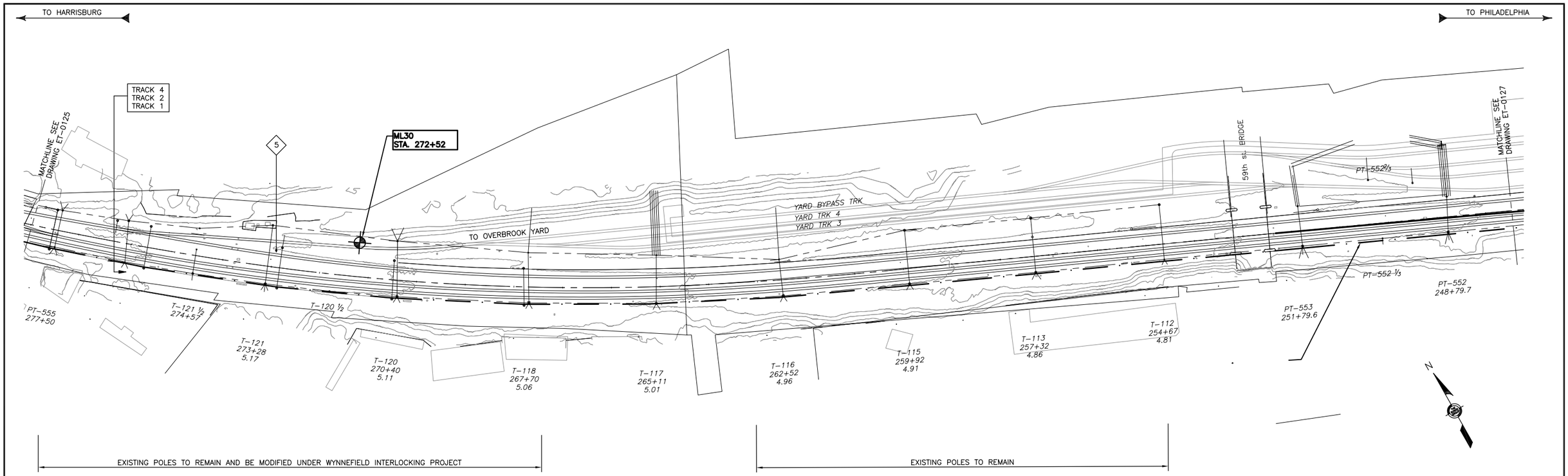
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 340+70 TO 309+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4124.DWG
Ref. No.:	2011-059
Sheet No:	271 OF 347

ET-4124

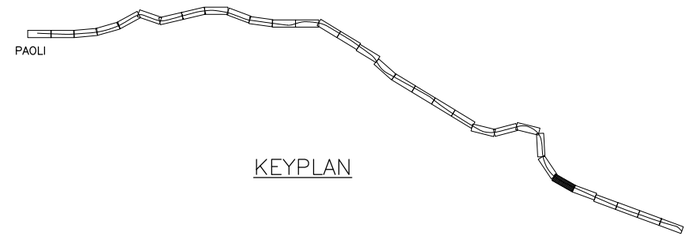
3/15/2016 7:48:25 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4124.dwg



BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 278+00 TO 247+50

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

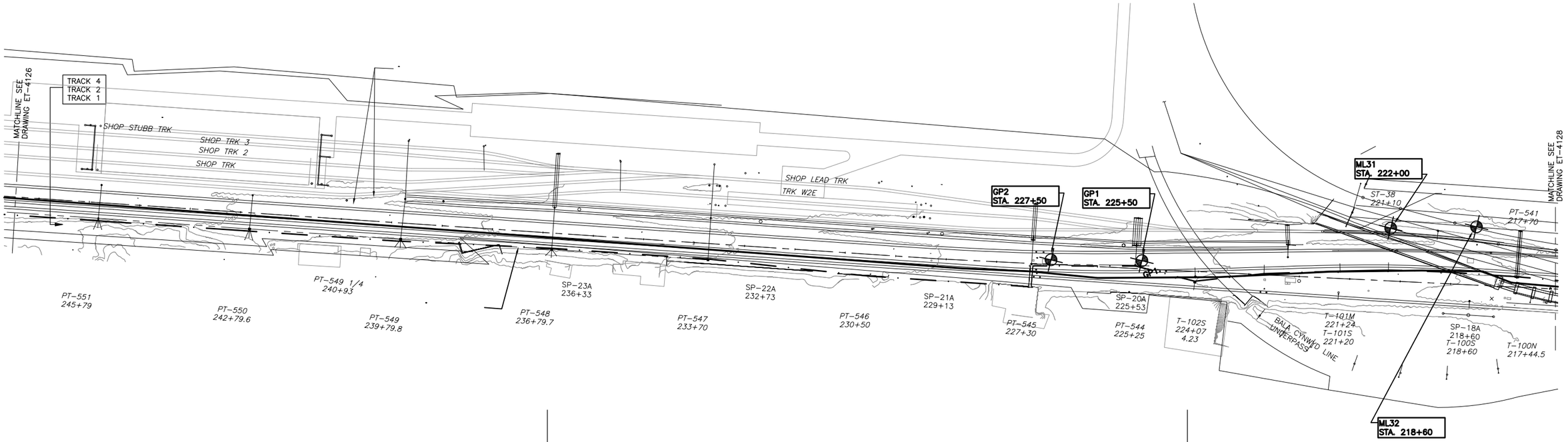
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Ref. No.:	2011-059
Sheet No:	272 OF 347

ET-4126

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TO HARRISBURG

TO PHILADELPHIA

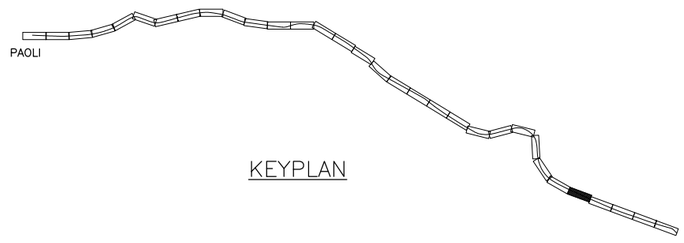


EXISTING POLES TO REMAIN AND BE MODIFIED UNDER WYNNEFIELD INTERLOCKING PROJECTY

BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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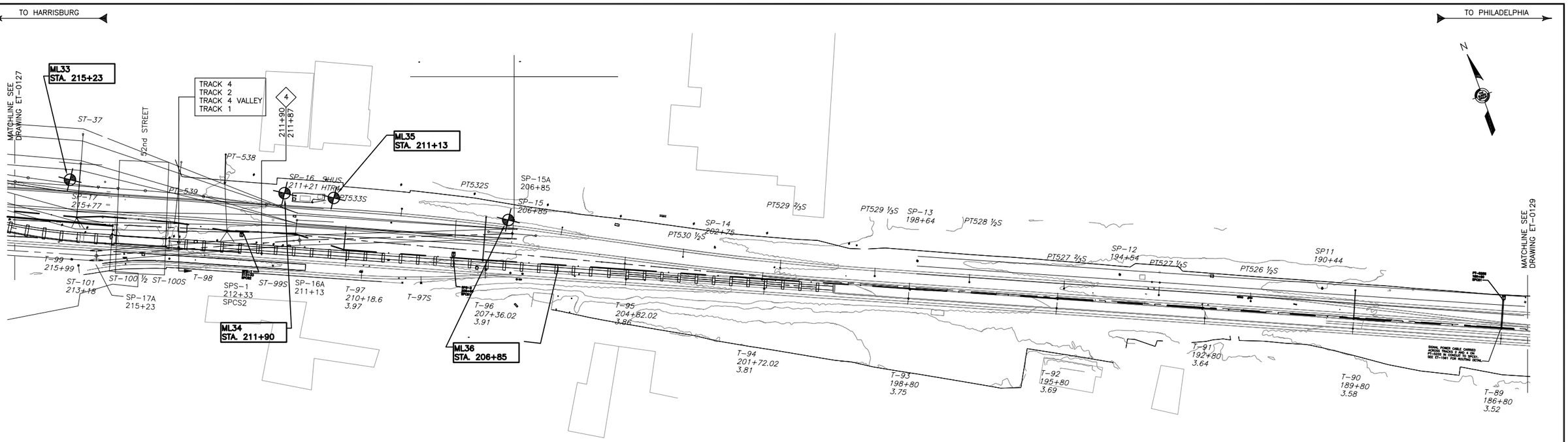
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 247+50 TO 217+00

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4127.DWG
Ref. No.:	2011-059
Sheet No:	273 OF 347

ET-4127

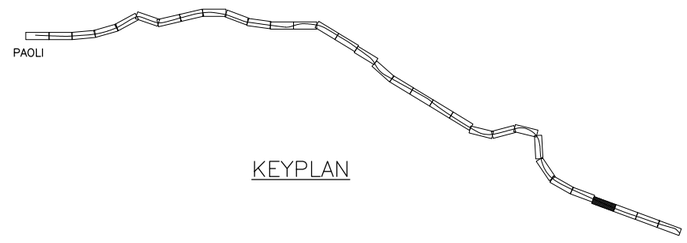
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BORING LOCATION PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
BORING LOCATION PLAN
STA. 217+00 TO 186+00

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-ET-4128.DWG
Ref. No.:	2011-059
Sheet No:	274 OF 347

ET-4128

3/15/2016 7:49:03 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\structural\2011-059-et-4128.dwg

Project:)Paoli to Zoo Transmission Line
Project Location:)Bryn-Mawr, Pennsylvania
Project Number:)11043

Log of Boring ML24
Sheet 1 of 1

Date(s)r Drilled)8/21/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)5.9'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)420'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 533+37 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5	S1		32-34-50-50/5"	1.0	50							Decomposed Rock, tan/gray, dry, very dense	
													Refusal at 5.9'	
)	10													
)	15													
)	20													
)	25													
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Haverford, Pennsylvania
Project Number:)11043

Log of Boring ML25
Sheet 1 of 1

Date(s)r Drilled)8/21/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)20'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)379'
Groundwater Levelr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 487+18 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5	S1		5-5-5-5	1.2	58					ML		Silt (ml), tan, moist, loose	
		S2		4-7-8-8	0.7	33					ML		Silt (ml), tan, moist, medium dense	
)	10	S3		9-15-17-15	0.4	21					ML		Silt (ml), tan/black, moist, dense	
)	15	S4		17-33-39-39	2.0	100					SM		Silty sand (sm) with decomposed rock, tan, dry, very dense	
)	20	S5		16-18-31-50	2.0	100					SM		Silty sand (sm) with decomposed rock, tan, dry, dense	
													Refusal at 20'	
)	25													
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Ardmore, Pennsylvania
Project Number:)11043

Log of Boring ML26
Sheet 1 of 1

Date(s)r Drilled)8/22/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)13.3'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)356'
Groundwater Levelr and Date Measured)13'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. -30" drop
Boreholer Backfill)Cuttings	Location)Sta. 446+57 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5	S1		9-3-3-5	1.7	83					ML		Silt (ml), tan, moist, loose	
		S2		6-7-10-10	1.6	79		24.1	NV	NP	SM		Silty sand (sm), gray/tan, moist, medium dense	
)	10	S3		6-11-11-13	1.8	88					SM		Silty sand (sm) with decomposed rock, gray/tan, moist, medium dense	
)	15	S4		50/4	0.3	17					SM		Silty sand (sm) with decomposed rock, gray/tan, moist, very dense	
													Refusal at 13.3'	
)	20													
)	25													
)	30													

BORING LOGS

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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
BORING LOGS
SHEET 12 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	

File No.:	2011-059-ET-4211.DWG
Ref. No.:	2011-059
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ET-4211

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Project:)Paoli to Zoo Transmission Line
Project Location:)Wynnewood, Pennsylvania
Project Number:)11043

Log of Boring ML27
Sheet 1 of 1

Date(s)r Drilled)8/22/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)302'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 392+32 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	3-3-2-2	1.0	50					ML		Silt (ml), tan, moist, loose	
			S2	2-3-3-3	1.5	75					ML		Silt (ml), tan, moist, loose	
			S3	5-11-11-3	1.2	58					ML		Silt (ml), tan, moist, medium dense	
	10													
			S4	6-6-7-10	1.8	92					SM		Silty sand (sm), orange, dry, medium dense	
	15													
			S5	11-16-18-19	1.7	83		27.1	NV	NP	SM		Silty sand (sm), tan/gray dry, dense	
	20													
			S6	11-14-17-23	1.9	96					SM		Silty sand (sm) with decomposed rock, tan/gray dry, dense	
	25												Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Narberth, Pennsylvania
Project Number:)11043

Log of Boring ML28
Sheet 1 of 1

Date(s)r Drilled)8/23/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)9.9'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)275'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta.372+11 S	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	8-11-13-13	0.3	17					ML		Silt (ml), brown, moist, medium dense	
			S2	16-24-30-35	0.3	17					ML		Silt (ml) with gravel, tan, moist, very dense	
	10		S3	29-29-40-50/5"	1.3	67							Decomposed rock, tan/white, dry, very dense	
													Refusal at 9.9'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Merion, Pennsylvania
Project Number:)11043

Log of Boring ML29
Sheet 1 of 1

Date(s)r Drilled)8/26/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0'
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)245'
Groundwater Leverlr and Date Measured)16.0'	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 323+60 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	2-4-3-15	1.7	83					ML		Silt (ml), brown, moist, loose	
			S2	24-23-30-24	1.5	75							Quartz, white, dry, very dense	
			S3	33-23-15-9	1.7	83		13.2	NV	NP	SM		Silty sand (sm) with gravel, brown, moist, dense	
	10													
			S4	2-3-7-4	1.5	75		43.0	NV	NP	SM		Silty sand (sm), tan, moist, loose	
	15													
			S5	3-3-3-4	1.8	88					ML		Silt (ml) with decomposed rock, tan, wet, loose	
	20													
			S6	4-9-13-18	2.0	100					ML		Silt (ml) with decomposed rock, tan, wet, medium dense	
	25												Boring Terminated at 25'	
	30													

BORING LOGS

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BORING LOGS
SHEET 17 OF 20

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-ET-4216.DWG
Ref. No.:	2011–059
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ET–4216

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Project: Paoli to Zoo Transmission Line
Project Location: Overbrook, Pennsylvania
Project Number: 11043

Log of Boring ML30
Sheet 1 of 1

Date(s) Drilled 8/26/13	Logged By K. Fischer	Checked By R. Crossan
Drilling Method 6" HSA	Drill Bit Size/Type 2" o.d. SBS	Total Depth of Borehole 6.4'
Drill Rig Type Truck Rig	Drilling Contractor Accurate Drilling	Approximate Surface Elevation 240'
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) ASTM D1586	Hammer Data 140 lb. –30" drop
Borehole Backfill Cuttings	Location Sta. 272+55 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
	5		S1	31–44–42–40	1.7	83							Decomposed rock, white/blue/gray, dry, very dense	
			S2	50/5"	0.3	17							Decomposed rock, white/blue/gray, dry, very dense	
	10		R1		96	64 RQD							Gray and brown schist	
													Auger Refusal at 6.4'	
	15													
	20													
	25													
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP1
Sheet 1 of 1

Date(s)r)9/12/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)201'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 225+50 (Between 2 and 4 Track)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, black, dry	
)	5		S–2		3.0	78					ML		Silt (ml) with decomposed rock, tan, moist	
)	10		S–3		3.8	100		20.6	NV	NP	SM		Silty Sand (sm), tan, moist	
)	15		S–4		3.8	100					SM		Silty sand (sm), tan, moist	
)			S–5		3.0	78					SM		Silty sand (sm) with decomposed rock, tan, moist	
)	20		S–6		3.8	100		26.1	NV	NP	ML		Silt (ml), tan, moist	
)	25		S–7		1.0	26							Decomposed rock, tan/brown, moist	
													Boring Terminated at 25'	
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring GP2
Sheet 1 of 1

Date(s)r)9/12/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)201'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 227+50 (Between 2 and 4 Track)	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0												Fill, black, dry	
)	5		S–2		3.8	100					SM		Silty sand (sm) with gravel, tan, dry	
)	10		S–3		3.8	100		25.3	42	15	ML		Silt (ml), tan, moist	
)	15		S–4		3.8	100							Decomposed rock, tan/red/brown, moist	
)			S–5		3.8	100							Decomposed rock, tan/red/brown, moist	
)	20												Boring Terminated at 20'	
)	25													
)	30													

BORING LOGS

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File No.:	2011-059-ET-4217.DWG
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Projects\104\Boring Logs to Paoli Boring Logs.bor[PennDot.tpl]

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML31
Sheet 1 of 1

Date(s) Drilled)8/26/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)25.0'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)201'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 220+55 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	7-7-7-7	1.0	50					Fill		Sandy fill, tan/black, dry, medium dense	
			S2	6-5-4-5	0.8	42					ML		Sandy silt (ml), brown, moist, loose	
)	10		S3	4-3-4-3	1.0	50					ML		Sandy silt (ml), black/brown, moist, loose	
)	15		S4	4-3-2-3	0.7	33					SM		Silty sand (sm), black/brown, moist, loose	
			S5	6-4-4-11	1.7	83		7.5	NV	NP	SM		Silty sand (sm) with gravel, black/brown, moist, loose	
)	20		S6	4-6-4-4	2.0	100		24.6	NV	NP	SM		Silty sand (sm), black/brown, moist, loose	
)	25												Boring Terminated at 25'	
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML32
Sheet 1 of 1

Date(s) Drilled)8/29/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)19.9'
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)201'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 218+60 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	4-3-3-5	0.5	25					Fill		Sandy fill, tan/black, dry, loose	
			S2	7-4-5-4	0.3	17					Fill		Fill with gravel, black, dry, loose	
)	10		S3	4-3-9-6	1.0	50							Decomposed rock, black, dry, medium desne	
)	15		S4	3-4-15-7	0.3	17							Decomposed rock, black/white, dry, medium desne	
			S5	7-4-8-50/5"	0.3	17							Decomposed rock, black/white, dry, medium desne	
)	20												Refusal at 19.9	
)	25													
)	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML33
Sheet 1 of 1

Date(s) Drilled)8/29/13	Logged By)K. Fischer	Checked By)R. Crossan
Drilling Method)6" HSA	Drill Bit Size/Type)2" o.d. SBS	Total Depth of Borehole)22.0
Drill Rig Type)Truck Rig	Drilling Contractor)Accurate Drilling	Approximate Surface Elevation)201'
Groundwater Level and Date Measured)Not Encountered	Sampling Method(s))ASTM D1586	Hammer Data)140 lb. –30" drop
Borehole Backfill)Cuttings	Location)Sta. 215+23 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	2-2-3-7	1.0	50					Fill		Fill, brown, moist, loose	
			S2	7-9-11-9	1.0	50					Fill		Fill, black, moist, medium dense	
)	10		S3	3-2-2-2	0.8	42					Fill		Fill, black, moist, very loose	
)	15		S4	3-11-7-7	0.8	32					Fill		Fill, black, dry, medium dense	
			S5	7-10-7-6	1.7	83					Fill		Fill, black/gray, dry, medium dense	
)	20		S6	5-9-8-10	1.0	50		23.6	NV	NP	ML		Silt (ml), tan, moist, medium dense	
)	25												Boring Terminated at 22'	
)	30													

BORING LOGS

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Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16	

File No.:	2011-059-ET-4218.DWG
Ref. No.:	2011-059
Sheet No:	278 OF 347

ET–4218

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Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML34
Sheet 1 of 1

Date(s)r Drilled)9/4/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)25.0
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)201'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 211+90 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	11–10–6–5	0.5	25					SM		Silty sand (sm) with gravel, tan/black, dry, medium dense	
			S2	7–7–5–4	0.8	42					SM		Silty sand (sm), tan, dry, medium dense	
)	10		S3	10–9–9–7	1.3	67		8.6	NV	NP	SM		Silty sand (sm), tan, dry, medium dense	
			S4	3–3–9–11	1.7	83					ML		Sandy silt (ml), tan/gray, moist, medium dense	
)	15										ML		Silt (ml), tan/gray, moist, medium dense	
			S5	14–16–10–10	2.0	100		24.8	NV	NP				
)	20													
			S6	16–12–12–22	2.0	100					ML		Sandy silt (ml), tan, dry, medium dense	
)	25												Boring Terminated at 25'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML35
Sheet 1 of 1

Date(s)r Drilled)9/4/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)23.3
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)200'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 211+13 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	16–12–9–11	1.2	58					SM		Silty sand (sm) with gravel, brown, dry, medium dense	
			S2	7–8–8–6	0.3	17					SM		Silty sand (sm) with gravel, brown, dry, medium dense	
)	10		S3	7–7–4–3	1.7	83					SM		Silty sand (sm) with decomposed rock, black, dry, medium dense	
			S4	8–12–12–12	2.0	100		19.2	NV	NP	ML		Silt with sand (ml), tan, moist, medium dense	
)	15										ML		Silt (ml), tan, moist, medium dense	
			S5	8–8–12–10	2.0	100								
)	20													
			S6	50/4"	0.3	17							Decomposed rock, gray/tan, dry, very dense	
)	25												Refusal at 23.3'	
	30													

Project:)Paoli to Zoo Transmission Line
Project Location:)Philadelphia, Pennsylvania
Project Number:)11043

Log of Boring ML36
Sheet 1 of 1

Date(s)r Drilled)9/11/13	Logged By)K. Fischer	Checked By)R. Crossan
Drillingr Method)6" HSA	Drill Bitr Size/Type)2" o.d. SBS	Total Depthr of Borehole)23.3
Drill Rigr Type)Truck Rig	Drillingr Contractor)Accurate Drilling	Approximater Surface Elevation)202'
Groundwater Leverlr and Date Measured)Not Encountered	Samplingr Method(s))ASTM D1586	Hammerr Data)140 lb. –30" drop
Boreholer Backfill)Cuttings	Location)Sta. 206.85 N	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Recovery (ft)	Recovery %	q, ksf	Water Content, %	LL, %	PI, %	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0													
)	5		S1	7–10–5–3	2.0	100					Fill		Fill, black, dry, medium dense	
			S2	5–2–2–2	1.0	50					Fill		Fill, black, dry, very loose	
)	10		S3	3–3–2–2	0.3	17					Fill		Fill, black, dry, loose	
			S4	4–5–6–8	2.0	100		23.5	NV	NP	ML		Silt with sand (ml), tan, moist, medium dense	
)	15										SM		Silty sand (sm), tan, moist, medium dense	
			S5	8–6–6–8	2.0	100		15.9	NV	NP				
)	20													
			S6	50/3"	0.2	8							Decomposed rock, white/black, dry, very dense	
)	25												Refusal at 23.3'	
	30													

BORING LOGS

NOTES:

1. BORINGS PERFORMED BY FIDELIS ENGINEERING.

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
BORING LOGS
SHEET 20 OF 20

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

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ET–4219

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GENERAL:

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS IN THE FIELD PRIOR TO FABRICATION. IF FIELD CONDITIONS PROHIBIT USE OF CONTRACT DRAWING DESIGN DETAILS, SUBMIT ALTERNATE DESIGN DETAILS FOR APPROVAL.

STRUCTURAL STEEL CONSTRUCTION:

1. PROVIDE STEEL IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) SPECIFICATIONS FOR STRUCTURAL STEEL BUILDING–ALLOWABLE STRESS DESIGN (LATEST VERSION) (INCLUDING FABRICATION AND ERECTION) AND THE AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION'S MANUAL FOR RAILWAY ENGINEERING, AREMA, (LATEST EDITION).

2. STRUCTURAL STEEL SHAPES:

   A. W SHAPES: ASTM A992 (Fy = 50 ksi).
   B. M AND S SHAPES: ASTM A992 (Fy = 50 ksi).
   C. CHANNELS: ASTM A36 (Fy = 36 ksi).
   D. ANGLES: ASTM A36 (Fy = 36 ksi).
   E. PLATES AND BARS: ASTM A572 (Fy = 50 ksi).
   F. WT SHAPES: CUT FROM ASTM A992 (FY = 50 ksi) W SHAPES.
   G. PIPE: ASTM A53 GRADE B (Fy = 35 ksi).
   H. SQUARE AND RECTANGULAR TUBULAR SECTIONS: ASTM A500 GRADE B (Fy = 46 ksi).

3. ALL STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 UNLESS NOTED OTHERWISE. FOUNDATION ANCHOR ROD, EMBEDMENT PLATE AND ATTACHED HARDWARE SHALL BE COMPLETELY GALVANIZED.

4. BOLTS SHALL BE ASTM A325 AND HOT DIPPED GALVANIZED PER ASTM F2329 UNLESS OTHERWISE NOTED. BOLTS SHALL BE ⅞"ø IN 15/16"ø HOLES UNLESS OTHERWISE NOTED. BOLT HOLES SHALL BE STANDARD ROUND HOLES WITH A DIAMETER 1/16" LARGER THAN THE BOLT DIAMETER UNLESS OTHERWISE NOTED. WHERE SLIP–CRITICAL (SC) CONNECTIONS OR USE OF AN OVERSIZED HOLE (OVS) OR SHORT SLOTTED (SSL) HOLES ARE SHOWN OR APPROVED, WIRE BRUSHING OF FAYING SURFACES TO "CLASS C" AND TENSIONING OF THE BOLTS IN ACCORDANCE WITH RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC) IS REQUIRED.

5. ALL BOLTS SHALL BE PRE–TENSIONED PER RCSC'S JUNE 30, 2004'S MIN. BOLT PRE–TENSIONED REQUIREMENTS AND SUBJECTED TO CALIBRATED WRENCH PRETENSIONING IN ACCORDANCE WITH SECTION 9.2.2 OF RSCS.

6. NUTS SHALL BE AMERICAN STANDARD SEMI–FINISHED HEAVY HEXAGONAL CONFORMING TO ANSI B 18.2.2.

7. NUTS AND WASHERS SHALL CONFORM TO ASTM A563 & F436, AND SHALL BE GALVANIZED PER ASTM F2329 UNLESS NOTED OTHERWISE.

8. ALL WELDING IS TO BE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE AMERICAN WELDING SOCIETY (INCLUDING THE STRUCTURAL STEEL WELDING CODE D1.1, LATEST EDITION) WELD METAL SHALL MATCH BASE METAL USING PROPER SERIES E70XX ELECTRODES PER AWS A5.1 AND A5.17.

9. FIELD WELDS SHALL NOT BE PERMITTED UNLESS AUTHORIZED BY THE ENGINEER.

10. SUBMIT ELECTRONIC VERSIONS (PDF) OF SHOP DRAWINGS FOR REVIEW TO THE ENGINEER PRIOR TO FABRICATION. REVIEW OF SHOP DRAWINGS IS FOR THE PURPOSE OF REVIEWING THE GENERAL CONFORMANCE TO THE OVERALL STRUCTURAL DESIGN.

11. HAND MARKS SHALL BE STAMPED ONTO EACH MEMBER ½" HIGH, 1/32" MIN INDENTATION.

12. FOUNDATION ANCHOR RODS SHALL BE SHIPPED ON A SEPARATE SKID FOR EACH FOUNDATION LOCATION AND SHALL BE SHIPPED WITH THREAD PROTECTORS ON EACH END.

13. FOUNDATION ANCHOR RODS SHALL CONFORM TO ASTM A449, THREADS SHALL BE UNC COARSE SERIES, ANCHOR RODS SHALL BE FULLY GALVANIZED PER ASTM F2329.

14. PROVIDE (2) 3" DIAMETER HOLES ON OPPOSITE SIDES OF THE STEEL CAISSON FOR RIGGING AND PLACEMENT. LOCATE THE RIGGING HOLES 5" FROM THE TOP OF THE CAISSON.

15. MINIMUM FILLET WELD SIZES WHERE WELD IS REQUIRED/INDICATED:

    3/16" WHEN THINNER JOINT MEMBER THICKNESS IS < 3/4".
    5/16" WHEN THINNER JOINT MEMBER THICKNESS IS EQUAL TO 3/4" OR > 3/4".

CONCRETE CONSTRUCTION:

1. CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE APPLICABLE AMERICAN CONCRETE INSTITUTE'S LATEST DOCUMENTS.

2. CONCRETE SHALL BE 4500 PSI AIR ENTRAINED AT 5 TO 7%, SLUMP LIMITS OF 4"±1" WITHOUT HIGH RANGE WATER REDUCER ADMIXTURE AND SLUMP LIMITS OF 5 TO 7 INCHES AFTER THE ADMIXTURE IS ADDED.

3. ALL CONCRETE SHALL HAVE A MINIMUM ULTIMATE 28 DAYS COMPRESSIVE STRENGTH OF 4500 PSI WITH MAXIMUM WATER/CEMENT RATIO OF .45. MAXIMUM AGGREGATE SIZE TO BE ¾" CONFORMING TO SIZE NO 67 OF ASTM C33. WATER TO BE CLEAN, FRESH AND POTABLE. CONCRETE SHALL BE MIXED IN ACCORDANCE WITH SPECIFICATIONS FOR READY–MIX CONCRETE ASTM C94. ADMIXTURES TO CONFORM TO ASTM C260 & C494. ADMIXTURES CONTAINING CHLORIDES ARE PROHIBITED.

4. ALLOW MINIMUM OF 7 DAYS OF CONCRETE CURING OF FOUNDATIONS/PIERS PRIOR TO PLACEMENT OF POLES/STRUCTURES. ALLOW MINIMUM OF 14 DAYS OF CONCRETE CURING PRIOR TO PLACEMENT OF WIRE/CABLE ON POLES/STRUCTURES.

5. GROUT SHALL BE NON–SHRINK GROUT MASTER FLOW 713 MANUFACTURED BY MASTER BUILDERS, SIKA GROUT 212 MANUFACTURED BY SIKA CORPORATION OR APPROVED EQUAL.

6. PROTECT FRESHLY PLACED CONCRETE AGAINST PREMATURE DRYING. CURING IS TO BEING IMMEDIATELY FOLLOWING PLACEMENT. MAINTAIN CONCRETE TEMPERATURE ABOVE 50°F AND IN A MOIST CONDITION FOR AT LEAST THE FIRST THREE DAYS.

7. WHEN CONCRETE IS BEING PLACED, USE MECHANICAL VIBRATORS TO CONSOLIDATE THE MIX.

8. PROVIDE 1" CHAMFER OF ALL EXPOSED EDGES OF CONCRETE.

9. REINFORCING BARS: STEEL REINFORCING BARS CONFORMING TO ASTM A615, GR. 60 KSI, DEFORMED.

10. CONCRETE COVER FOR REINFORCEMENT:

CAST AGAINST SOIL	3"
FORMED CONCRETE	2"

FOUNDATIONS:

1. PRELIMINARY REQUIREMENTS:
   A. EXPLORATORY TRENCHES ARE TO BE HAND DUG TO DETERMINE THE PRESENCE OF ANY UNDERGROUND INSTALLATIONS/CABLES. THE TRENCHES SHALL BE IN THE SHAPE OF AN "H" WITH OUTSIDE DIMENSIONS MATCHING THE LIMITS OF THE FOUNDATION EXCAVATION AND DUG TO A DEPTH OF THREE FEET. FILL AND COMPACT THE TRENCHES AFTER CHECKING FOR SUBSURFACE FACILITIES.

2. TEMPORARY SHEETING AND SHORING:
   A. LOCATE 3 FEET DEEP BY 15 INCHES WIDE EXPLORATORY TRENCHES ON THE CONSTRUCTION SHOP DRAWINGS. THE EXTENT OF EACH TRENCH SHALL BE IN THE FORM OF AN "H" WHOSE OUTSIDE DIMENSIONS MATCH THE EXTENT OF THE OUTSIDE FACE OF THE SHEETING DIMENSIONS.
   B. MEASURES SHALL BE TAKEN SO ABSOLUTE USE OF TRACK IS MAINTAINED WHILE DRIVING SHEETING ADJACENT TO RUNNING TRACK.
   C. CAVITIES CREATED BY DRIVING OF SHEET PILING SHALL BE FILLED WITH SAND AND ANY DISTURBED BALLAST SHALL BE RESTORED AND TAMPED IMMEDIATELY.
   D. SHEET PILING SHALL BE CUT OUT AT TOP OF THE TIE DURING CONSTRUCTION AND THEN, AFTER CONSTRUCTION SHALL BE CUT OFF EIGHTEEN INCHES BELOW EXISTING GROUND LINE OR GRADE AND LEFT IN PLACE.
   E. IF TEMPORARY SHEETING AND SHORING IS REQUIRED, IT SHALL BE IN ACCORDANCE WITH AMTRAK'S "REQUIREMENTS FOR TEMPORARY SHEETING AND SHORING TO SUPPORT AMTRAK TRACKS"

3. EXCAVATION AND BACKFILL:
   A. ALL EXCAVATION SHALL CONFORM TO THE LINES, GRADES, SECTIONS AND ELEVATIONS SHOWN ON THE DRAWINGS OR AS MAY BE NEEDED TO PERFORM CONSTRUCTION PROVIDED IT IS SUBMITTED FOR APPROVAL.
   B. RESTORE OVER EXCAVATED AREAS TO THE REQUIRED GRADES BY BACKFILLING WITH LEAN CONCRETE BACKFILL.
   C. THE EXCAVATION SHALL BE COVERED AND RAMPED EACH NIGHT AND BARRICADES AND WARNING LIGHTS PROVIDED.

4. FOUNDATIONS:
   A. FOR PIER TYPE FOUNDATIONS STEEL CASING SHALL BE DRIVEN INTO PLACE TO PROVIDE THE CLOSEST AND BEST CONTACT BETWEEN THE STEEL CASING AND SUPPORTING SOILS ANY GAPS BETWEEN THE CASING AND ADJACENT SOIL SHALL BE GROUTED.
   B. INTERIOR SOIL SHALL BE EXCAVATED BY HAND OR BY POWERED AUGER.
   C. FOUNDATIONS SHALL BE LOCATED WITHIN A RADIUS OF 3" INCHES OR 4.2% OF SHAFT DIAMETER WHICHEVER IS LESS OF THE REQUIRED ALIGNMENT AND WITHIN A SLOPE OF 3/16 INCH PER FOOT OUT OF PLUMB.
   D. FOUNDATIONS AND PIERS SHALL BE INSTALLED TO THE DEPTHS SHOWN ON THE DRAWING. IF BEDROCK IS REACHED BEFORE PIER EMBEDMENT REQUIREMENTS, MIN. OF 5FT OF EMBEDMENT INTO SOUND ROCK IS REQUIRED, HOWEVER TOTAL EMBEDMENT LENGTH NEED NOT EXCEED THE REQUIRED PIER EMBEDMENT LENGTHS.
   E. SOUND ROCK SHALL BE CLASSIFIED USING AN EVALUATION OF THE UNCONFINED COMPRESSIVE STRENGTH OF THE MATERIAL AND THE MEANS BY WHICH IT IS EXCAVATED. AN UNCONFINED COMPRESSIVE STRENGTH OF 18 TONS PER SQUARE FOOT (TSF) SHALL BE USED AS A MINIMUM VALUE FOR SOUND ROCK. IF THE MATERIAL HAS TO BE EXCAVATED USING A CORE BARREL AND NOT A TRADITIONAL AUGER IT SHALL ALSO BE CLASSIFIED AS ROCK. WEATHERED ROCK IS ANY MATERIAL THAT CAN STILL BE EXCAVATED USING A STANDARD AUGER AND HAS AN UNCONFINED COMPRESSIVE STRENGTH LESS THAN 18 TSF. WEATHERED ROCK SHALL NOT BE CONSIDERED PART OF THE ROCK SOCKET.
   F. REMOVE ALL LOOSE MATERIALS AND DE–WATER EXCAVATION AS REQUIRED FOR INSPECTION PRIOR TO CONCRETING.
   G. CONCRETE PIERS AND REBAR CAGES SHALL BE MARKED WITH THEIR IDENTIFYING STRUCTURE NUMBERS.
   H. REBAR CAGE ASSEMBLY SHALL HAVE THE TOP TWO AND BOTTOM BINDER BARS TACK WELDED TO THE VERTICAL BARS TO MAINTAIN THE SHAPE OF THE CAGE. THE REMAINDER OF THE ASSEMBLY SHALL BE TIE WIRED AT A MINIMUM OF TWO WRAPS PER CONNECTION BY A MECHANIZED TIE WIRE DEVICE.

STRUCTURAL ABBREVIATIONS

A.B.	ANCHOR BOLT
B/	BOTTOM OF
BC	BOTTOM OF CURB ELEVATION
C/C	CENTER TO CENTER
CIP	CAST IRON PIPE
℄	CONSTRUCTION JOINT
C.J.	CONTROL JOINT
℄	CENTER LINE
CLR.	CLEAR
COL.	COLUMN
CONC.	CONCRETE
CTSK	COUNTERSUNK
DEG.	DEGREE
DET.	DETAIL
DIA. or ø	DIAMETER
DIM.	DIMENSION
DWG.	DRAWING
DWLS.	DOWELS
EA.	EACH
E.B.	EASTBOUND
E.F.	EACH FACE
ELEC.	ELECTRICAL
E.E.P.	ELECTRICAL EQUIPMENT PAD
EL.	ELEVATION
EMBED.	EMBEDMENT
E.P.	EQUIPMENT PAD
EXIST.	EXISTING
EXP. BOLT	EXPANSION BOLT
EXP. JT.	EXPANSION JOINT
E.W.	EACH WAY
FIN.	FINISH
FIXT.	FIXTURE
FLD.	FIELD
F.F.	FAR FACE
F.L.	FULL LENGTH
FLG.	FLANGE
FLR.	FLOOR
FRMG.	FRAMING
FTG.	FOOTING
GA.	GAGE (DISTANCE)
GA.	GAUGE (THICKNESS)
GALV.	GALVANIZED
GRD.	GRADE, GROUND
GRTG.	GRATING
H.H.N.	HEAVY HEX NUT
HK.	HOOK
HOR.	HORIZONTAL
H.P.	HIGH POINT
HT.	HEIGHT
I.D.	INSIDE DIAMETER
INTERM.	INTERMEDIATE
JT.	JOINT
L	ANGLE
LGT.	LIGHTING
LLBB	LONG LEG BACK TO BACK
LLH	LONG LEG HORIZONTAL
LLOS	LONG LEG OUTSTANDING
LLV	LONG LEG VERTICAL
L.P.	LOW POINT
MATL.	MATERIAL
MAX.	MAXIMUM
MEMB.	MEMBRANE
MET.	METAL
MH	MANHOLE
MIN.	MINIMUM
MISC.	MISCELLANEOUS
N.F.	NEAR FACE (REINF.)
NO.	NUMBER
N.S.	NEAR SIDE (REINF.)
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.H.	OPPOSITE HAND
OPNG.	OPENING
OPP.	OPPOSITE
O.S.	OUTSTANDING
O. TO O.	OUT TO OUT
℄	PLATE
℄	PROPERTY LINE
PROJ.	PROJECTION
PT.	POINT
R	RADIUS OR RISER
RD.	ROUND
RECT.	RECTANGULAR
REF.	REFERENCE
REINF.	REINFORCEMENT
REQD.	REQUIRED
REV.	REVISION
R.R.	RAILROAD
R/W	RIGHT–OF–WAY
SCHED.	SCHEDULE
SECT.	SECTION
SHT.	SHEET
SIM.	SIMILAR
SPA.	SPACE
STD.	STANDARD
STIFF.	STIFFENER
STL.	STEEL
STR.	STRUCTURAL
ST. STL.	STAINLESS STEEL
SYM.	SYMMETRICAL
T	TREAD
T/	TOP OF
THD.	THREADED
TEMP.	TEMPORARY
TR	TOP OF RAIL ELEVATION
TYP.	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
VERT.	VERTICAL
VIF	VERIFY IN FIELD
VOL.	VOLUME
W/	WITH
W.B.	WESTBOUND
WL	WORK LINE
W.P.	WORK POINT, WATERPROOFING
W.S.	WATER STOP
WT.	WEIGHT
W.W.F.	WELDED WIRE FABRIC

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IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – GENERAL DRAWINGS
STRUCTURAL STEEL AND CONCRETE NOTES

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

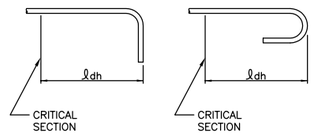
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BASIC DEVELOPMENT LENGTH AND SPLICE LENGTH								
BAR SIZE	BASIC DEVELOPMENT LENGTH, ld				CLASS B SPLICE LENGTH, 1.3 x ld			
	CLEAR SPACING ≥ 4"		CLEAR SPACING < 4"		CLEAR SPACING ≥ 4"		CLEAR SPACING < 4"	
	BASIC	TOP	BASIC	TOP	BASIC	TOP	BASIC	TOP
#3	1'-0"	1'-0"	1'-0"	1'-3"	1'-0"	1'-2"	1'-3"	1'-7"
#4	1'-0"	1'-2"	1'-6"	2'-0"	1'-2"	1'-7"	2'-0"	2'-7"
#5	1'-2"	1'-6"	2'-2"	2'-10"	1'-6"	1'-11"	2'-10"	3'-8"
#6	1'-5"	1'-9"	2'-11"	3'-9"	1'-9"	2'-4"	3'-9"	4'-11"
#7	2'-0"	2'-7"	4'-7"	6'-0"	2'-7"	3'-4"	6'-0"	7'-9"
#8	2'-3"	2'-11"	5'-8"	7'-4"	2'-11"	3'-10"	7'-4"	9'-6"
#9	2'-10"	3'-8"	6'-4"	8'-3"	3'-8"	4'-9"	8'-3"	10'-8"
#10	3'-6"	4'-6"	7'-2"	9'-3"	4'-6"	5'-10"	9'-3"	12'-0"
#11	4'-2"	5'-5"	7'-11"	10'-3"	5'-5"	7'-0"	10'-3"	13'-4"
#14	5'-8"	7'-4"	9'-6"	12'-4"	7'-4"	9'-7"	12'-4"	16'-0"

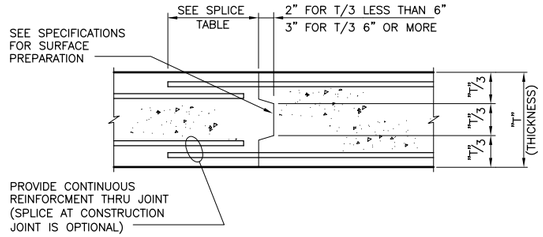
DEVELOPMENT LENGTH OF STANDARD HOOKS		
BAR SIZE	DEVELOPMENT LENGTH, ldh	
	BASIC	W/ CONC COVER
#3	0'-7"	0'-6"
#4	0'-9"	0'-7"
#5	1'-0"	0'-8"
#6	1'-2"	0'-10"
#7	1'-4"	0'-11"
#8	1'-6"	1'-1"
#9	1'-9"	1'-3"
#10	1'-11"	1'-4"
#11	2'-2"	1'-6"
#11	3'-8"	2'-7"



NOTES:

1. NOTES FOR DEVELOPMENT LENGTH AND SPLICE TABLE:
   A) Fy = 60000 PSI
      f'c = 4500 PSI OR GREATER
      UNCOATED BARS
      NORMAL WEIGHT CONCRETE
      CLEAR COVER ≥ 2" AND CLEAR SPACING ≥ 4"
      BARS IN TENSION
   B) FOR CLEAR COVER OR CLEAR SPACING LESS THAN THE VALUES IN "NOTE A" ABOVE, MULTIPLY THE LENGTHS SHOWN IN THE TABLES BY THE APPROPRIATE MULTIPLIERS PROVIDED IN ACI 318.
   C) FOR MATERIALS OR CONDITIONS DIFFERENT FROM THOSE STATED, REFER TO ACI 318, CHAPTER 12 FOR THE APPROPRIATE MULTIPLIERS.
   D) TOP BARS ARE DEFINED AS ALL HORIZONTAL REINFORCEMENT PLACED WITH 12" OR MORE FRESH CONCRETE CAST BELOW THE DEVELOPMENT LENGTH OR SPLICE.
   E) FOR HOOK EMBEDMENTS, CONCRETE COVER INDICATES SIDE COVER (NORMAL TO THE PLANE OF HOOK) OF AT LEAST 2.5", AND FOR 90 DEGREE HOOK WITH COVER ON THE BAR EXTENSION BEYOND THE HOOK OF AT LEAST 2".
   F) FOR EPOXY COATED BARS, MULTIPLY LENGTHS SHOWN BY 1.2. HOWEVER, FOR STRAIGHT BARS WHERE COVER IS LESS THAN 3 x BAR DIAMETER OR CLEAR SPACING IS LESS THAN 6 x BAR DIAMETER, MULTIPLY LENGTHS SHOWN BY 1.5.
2. WHERE SPLICES ARE INDICATED BETWEEN BARS OF DIFFERENT SIZES, THE SPLICE LENGTH SHALL BE BASED ON THE SMALLER BAR SIZE.
3. VERTICAL REINFORCEMENT FOR CONCRETE OR MASONRY SHALL BE SPLICED WITH DOWEL BARS OF THE SAME SIZE AND SPACING FROM THE FOUNDATION USING A STANDARD SPLICE LENGTH.
4. DOWELS SHOWN EXTENDING FROM PREVIOUSLY PLACED CONCRETE SHALL EXTEND ONE SPLICE LENGTH BEYOND THE JOINT, UNLESS DIMENSIONED OTHERWISE. WHERE A DIMENSION IS PROVIDED, THE BAR SPLICING TO THE DOWEL SHALL END ONE SPLICE LENGTH FROM THE END OF THE DOWEL.

1 — REINFORCEMENT LAP SPLICE AND EMBEDMENT LENGTH TABLE
SCALE: N.T.S.



NOTE: WHERE "T" EXCEEDS 2'-0" SEE SECTIONS.

NOTE:
1. MAX. SPACING OF CONSTRUCTION JOINT = 30'-0" FT.

2 — CONSTRUCTION JOINT DETAIL FOR WALLS AND SLABS
SCALE: N.T.S.

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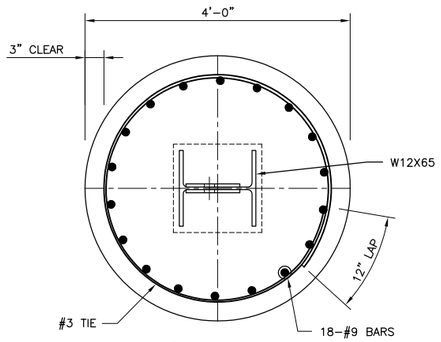
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
STRUCTURAL TYPICAL DETAILS

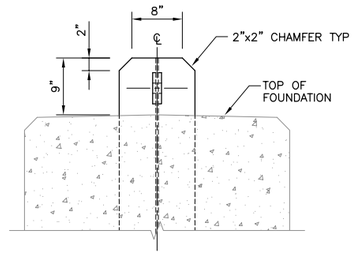
Recommended: AJT | Drawn: TAB | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5001.DWG
Ref. No.:	2011-059
Sheet No:	281 OF 347

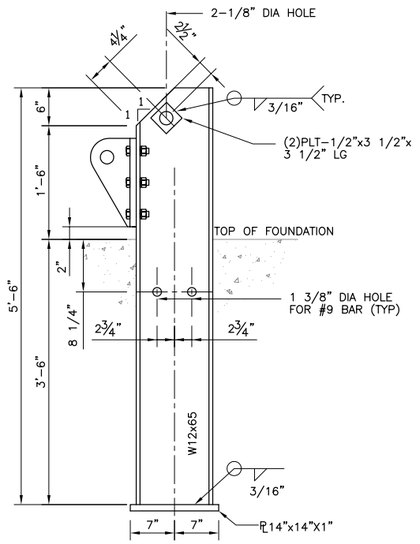
S-5001



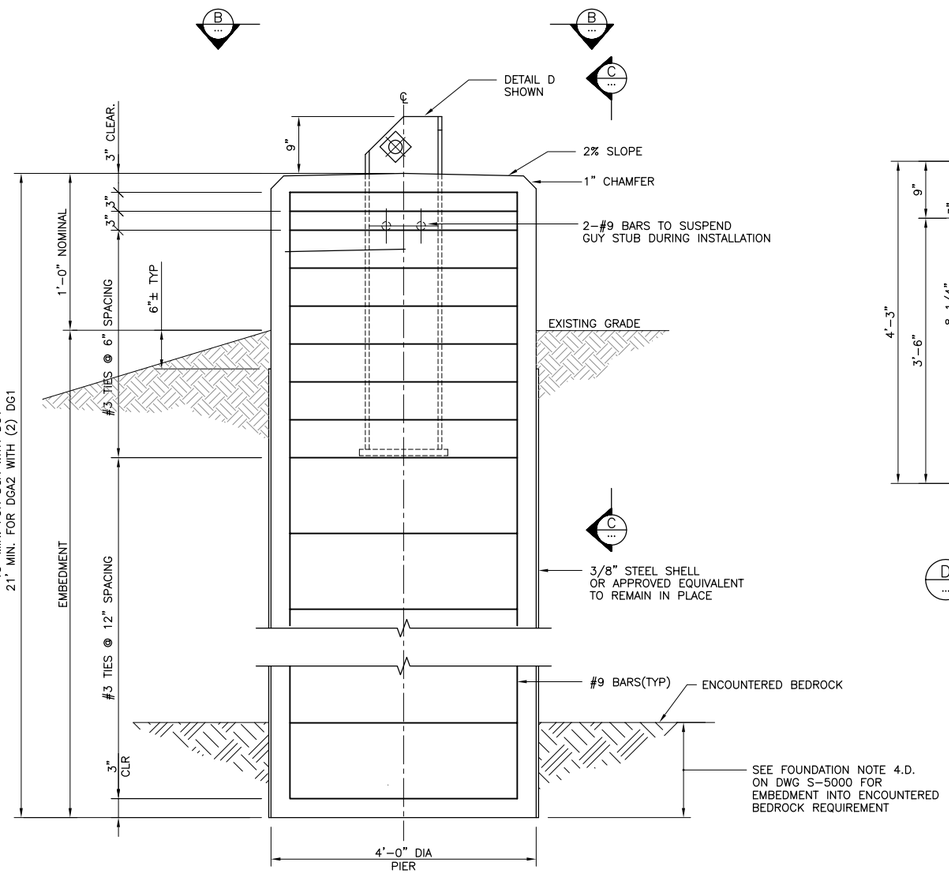
B SECTION
SCALE: 1"=1'-0"



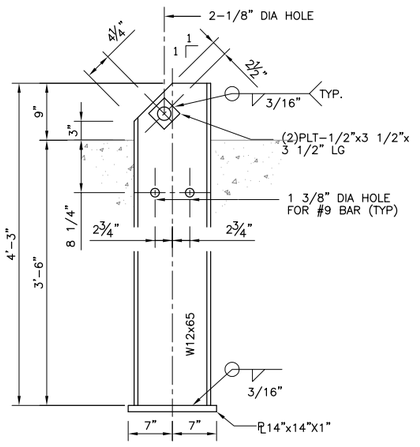
C SECTION
SCALE: 1"=1'-0"



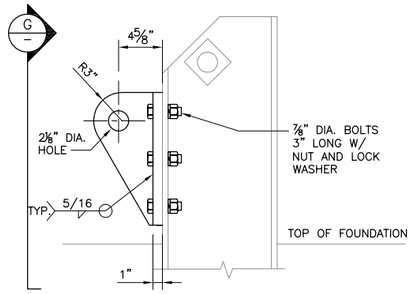
E DOWN GUY STUB DETAIL (TWO HOLES) (DGA2)
SCALE: 1"=1'-0"



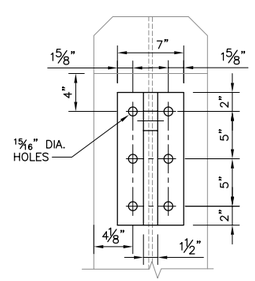
A 48" DIA DOWN GUY ANCHOR DETAIL (DGA & DGA2)
SCALE: 1"=1'-0"



D DOWN GUY STUB DETAIL (DGA)
SCALE: 1"=1'-0"



F DOWN GUY PLATE
SCALE: 1-1/2"=1'-0"



G ELEVATION
SCALE: 1-1/2"=1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

1' 6" 0 1'
SCALE:1-1/2"= 1'-0"

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

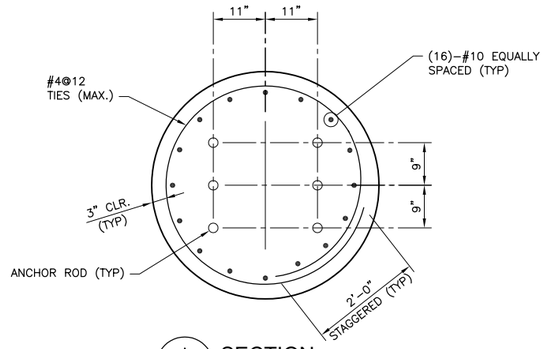
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
CATENARY DOWN GUY ANCHOR (DGA & DGA2)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

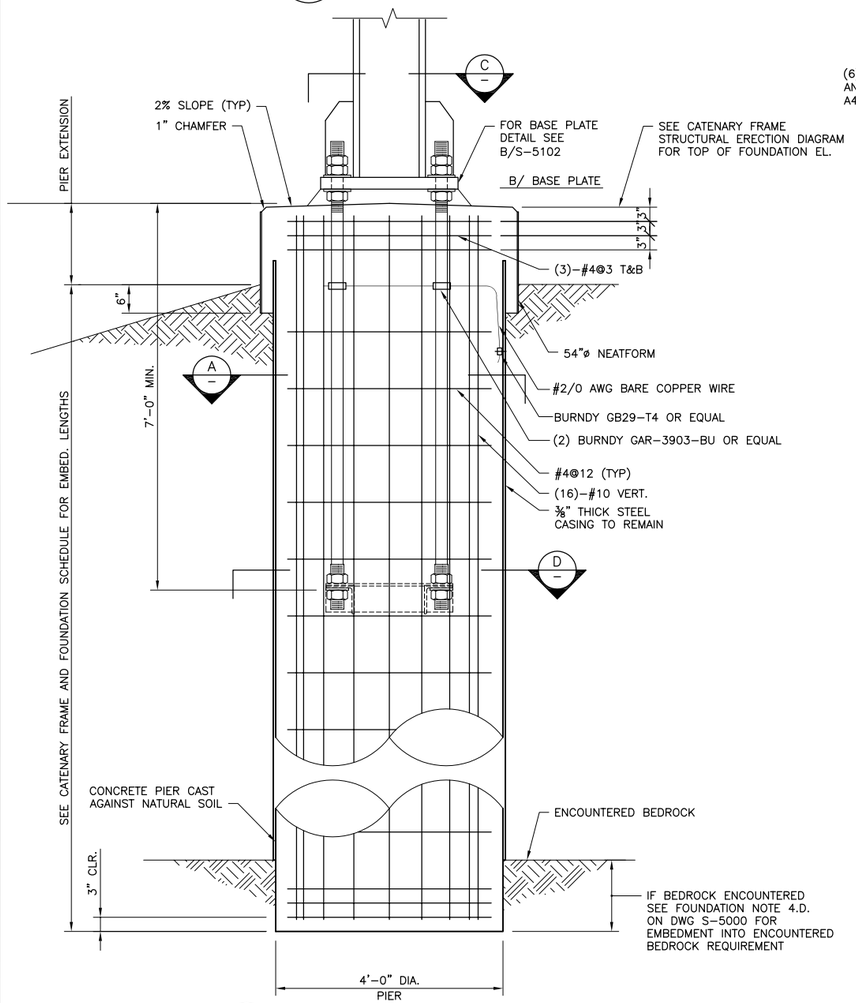
File No.:	2011-059-S-5101.DWG
Ref. No.:	2011-059
Sheet No:	282 OF 347

S-5101

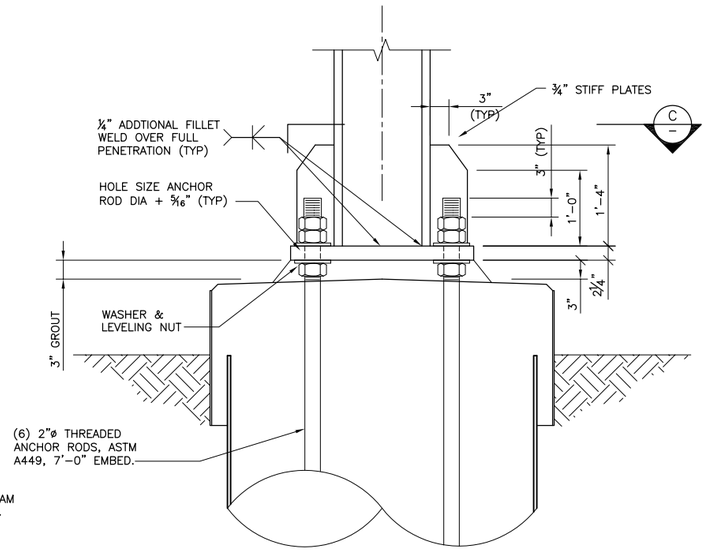
3/14/2016 4:15:19 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5101.dwg



A — SECTION
SCALE: 3/4" = 1'-0"



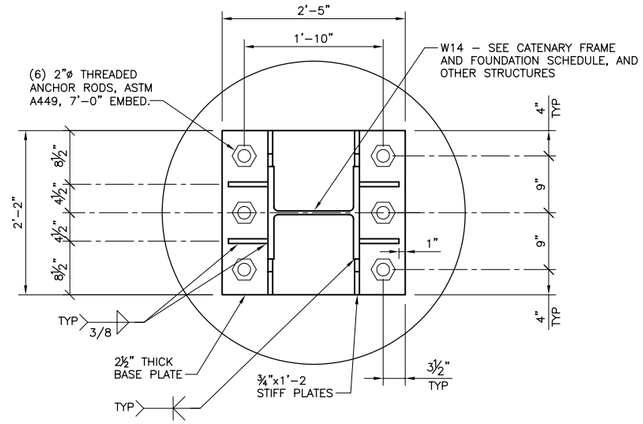
1 — FOUNDATION DETAIL (F1)
SCALE: 3/4" = 1'-0"



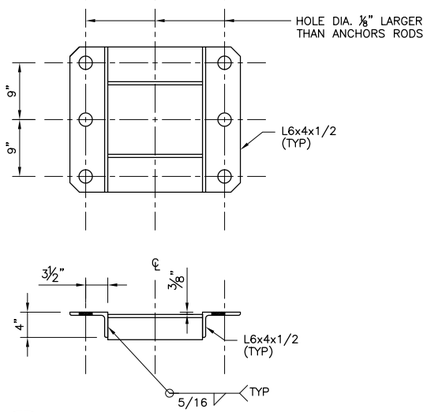
B — BASE PLATE DETAIL (BP1)
SCALE: 1" = 1'-0"

NOTES:

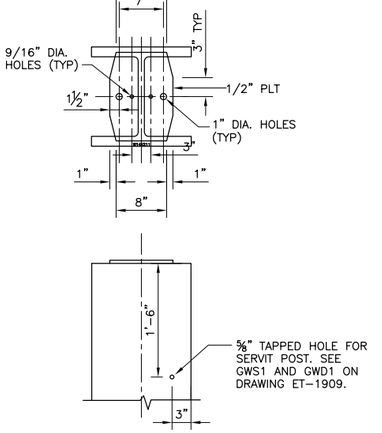
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S–5001.
3. FOR FOUNDATION EMBEDMENT LENGTH SEE CATENARY FRAME AND FOUNDATION SCHEDULE DRAWINGS S–5115, S–5116, S–5117, S–5118 AND S–5119.



C — SECTION
SCALE: 1" = 1'-0"



D — ANCHOR PLATE DETAIL
SCALE: 1" = 1'-0"



E — POLE TOP PLATE DETAIL
SCALE: 1" = 1'-0"

1' 6" 0 1'
SCALE:3/4"=1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
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IN ASSOCIATION WITH

Baker
AECOM

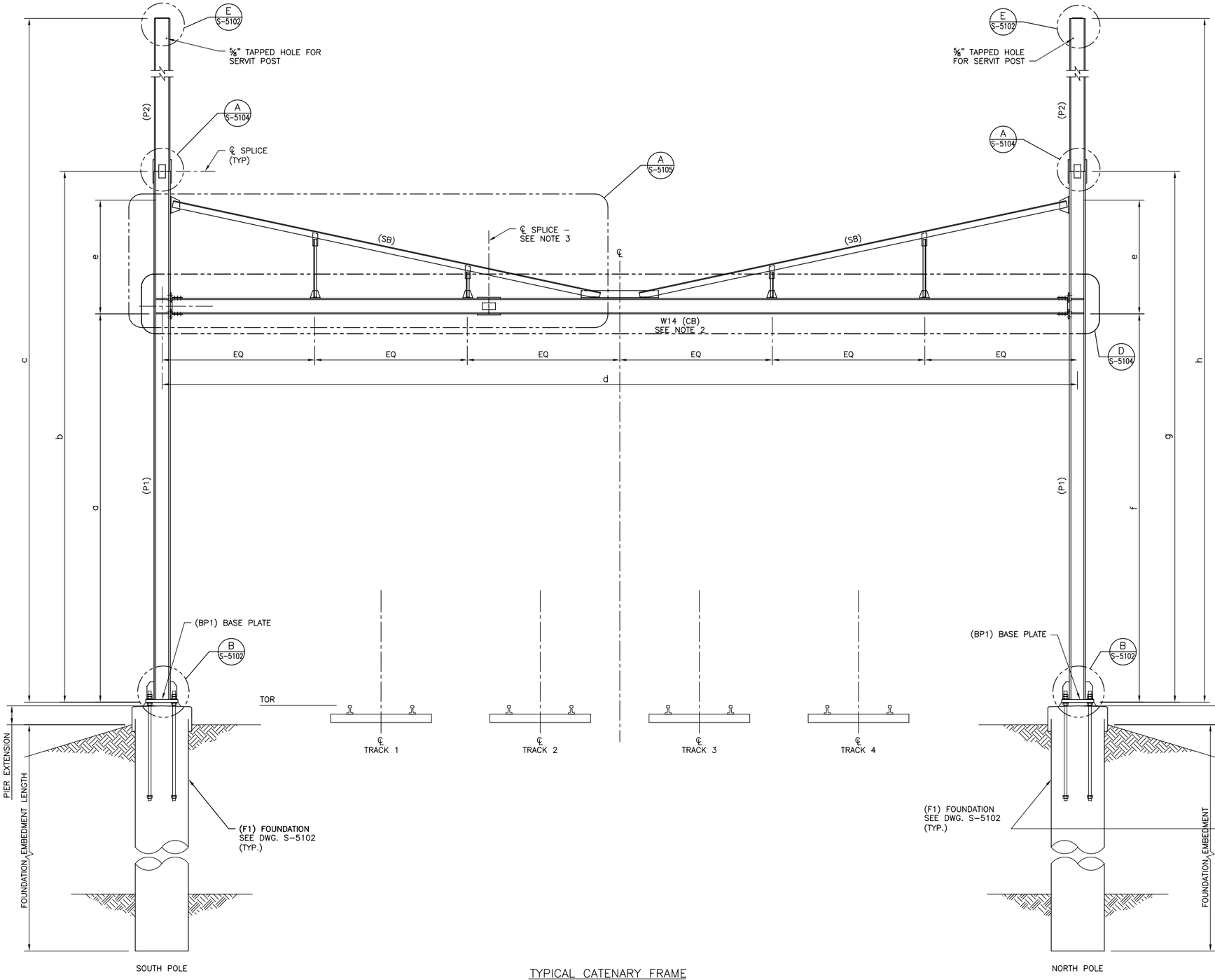
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY FOUNDATION (F1), BASE PLATE (BP1)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5102.DWG
Ref. No.:	2011-059
Sheet No:	283 OF 347

S–5102

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TYPICAL CATENARY FRAME
SCALE: 1/4" = 1'-0"
LOOKING WEST

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR CATENARY ID STRUCTURE AND MEMBER SIZES SEE CATENARY SCHEDULE ON DRAWINGS S-5115, S-5116, S-5117, S-5118, AND S-5119.
3. SUGGESTED SPLICE LOCATION OF CB. CONTRACTOR MAY SUBMIT OTHER LOCATIONS TO SUIT EACH CATENARY FRAME AND SUBMIT FOR APPROVAL.
4. FOR STRUCTURE DIMENSIONS AND FOUNDATION EMBEDMENT LENGTH SEE CATENARY FRAME AND FOUNDATION SCHEDULE DRAWINGS S-5115, S-5116, S-5117, S-5118 AND S-5119.
5. FOR POLES WITH W14x159 OR HEAVIER AS A BASE COLUMN P1, LADDER STEP RUNGS SHALL BE INSTALLED ON "S" SIDE OF THE P1 AND P2 POLES. PLEASE SEE DRAWING S-5124 FOR INFORMATION.

4' 2' 0 4'
SCALE: 1/4"= 1'-0"

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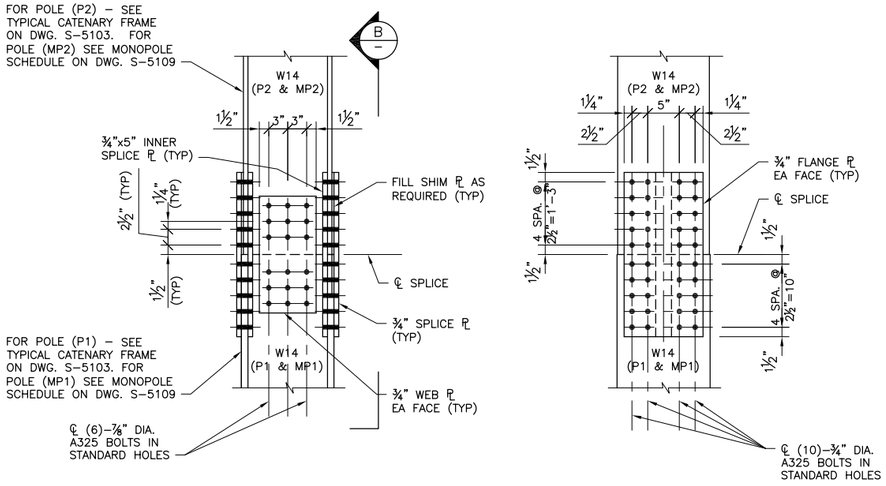
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY FRAME

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5103.DWG
Ref. No.:	2011-059
Sheet No:	284 OF 347

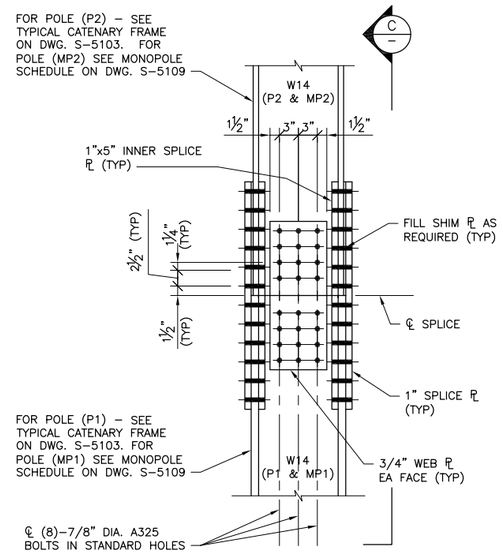
S-5103

3/14/2016 4:15:27 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5103.dwg



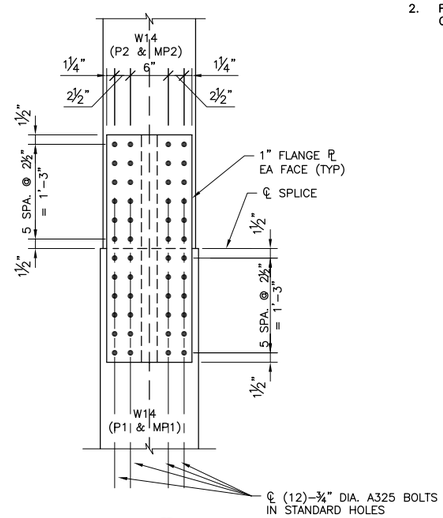
B SECTION
SCALE: 1" = 1'–0"

W14x90 AND W14x99 AT POLES (P2) AND (MP2)



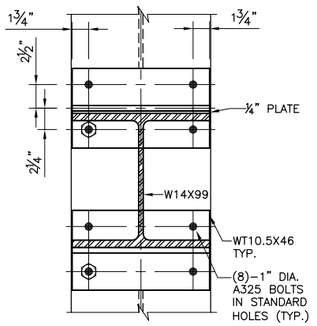
W14x109, W14x120, W14x132 AND W14x145 AT POLES (P2) AND (MP2)

C SECTION
SCALE: 1" = 1'–0"



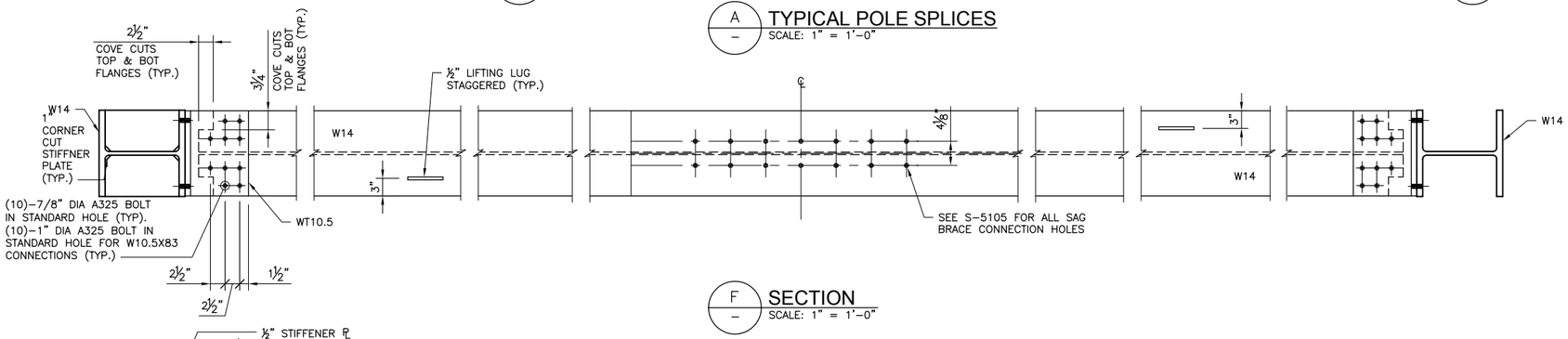
NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR CROSS BEAMS OF W14x109 AND W14x120 USE WT10.5x83 WITH CENTER TO CENTER BOLT SPACING AS SHOWN ON SECTION G OF THIS DRAWING.

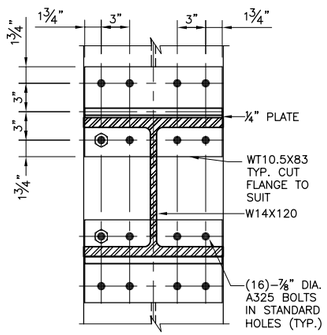


E SECTION
SCALE: 1 1/2" = 1'–0"

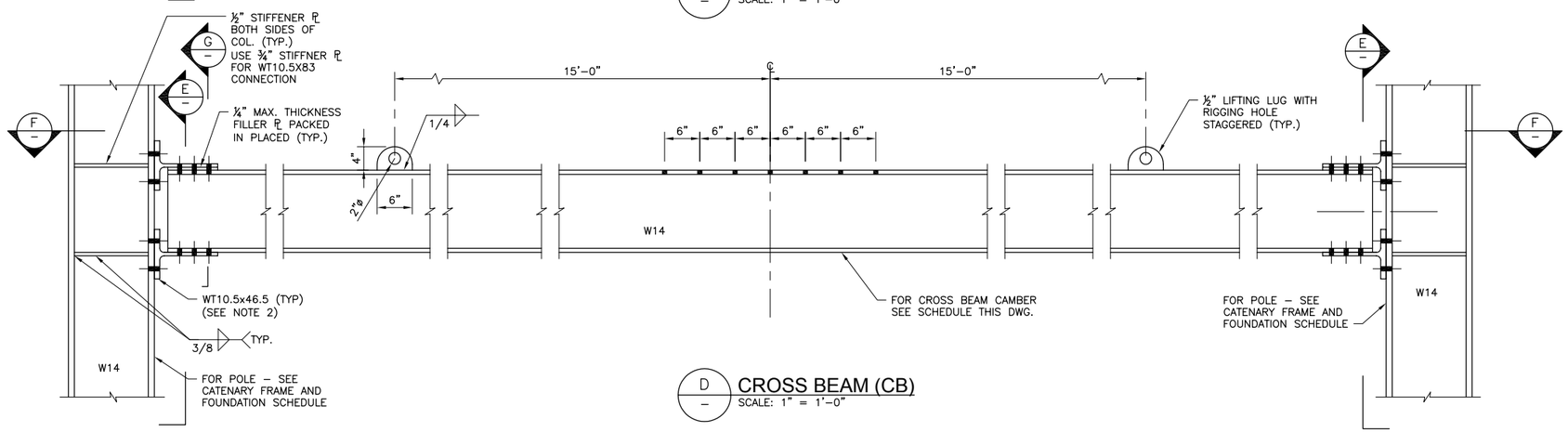
A TYPICAL POLE SPLICES
SCALE: 1" = 1'–0"



F SECTION
SCALE: 1" = 1'–0"



G SECTION
SCALE: 1 1/2" = 1'–0"



D CROSS BEAM (CB)
SCALE: 1" = 1'–0"

CROSS BEAM CAMBER SCHEDULE	
SPAN "d"	MID–SPAN CAMBERS
< 50'	1"
50' TO 60'	1½"
60' TO 65'	2"
65' TO 70'	3"
70' TO 75'	3½"
75' TO 80'	4"
80' TO 85'	5"
85' TO 90'	7"
90' TO 95'	8"

1' 0 1' 2'
SCALE: 1"=1'–0"

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY CROSS BEAM (CB) AND POLE SPLICE DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

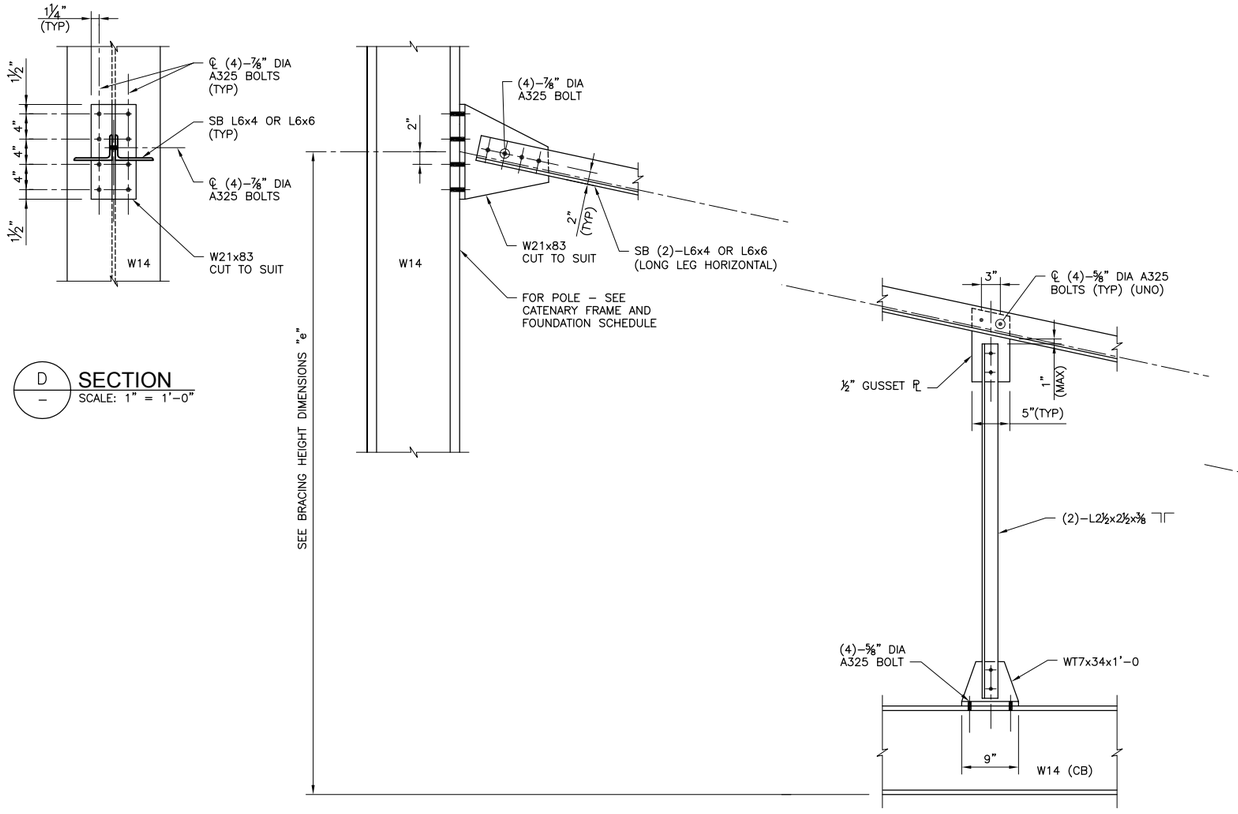
File No.:	2011–059–S–5104.DWG
Ref. No.:	2011–059
Sheet No:	285 OF 347

S–5104

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3/17/2016 2:37:54 PM

NOTE:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FIELD VERIFY DIMENSION PRIOR TO FABRICATION.
3. FOR DIMENSIONS NOT SHOWN SEE TYPICAL CATENARY FRAME ON DWG. S–5103.
4. FOR SAG BRACE SIZES SEE CATENARY FRAME TABLES ON DRAWINGS S–5115, S–5116, S–5117, S–5118 AND S–5119.



D / – SECTION
SCALE: 1" = 1'–0"

B / – SECTION
SCALE: 1" = 1'–0"

A / – SAG BRACE (SB1)
SCALE: 1" = 1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

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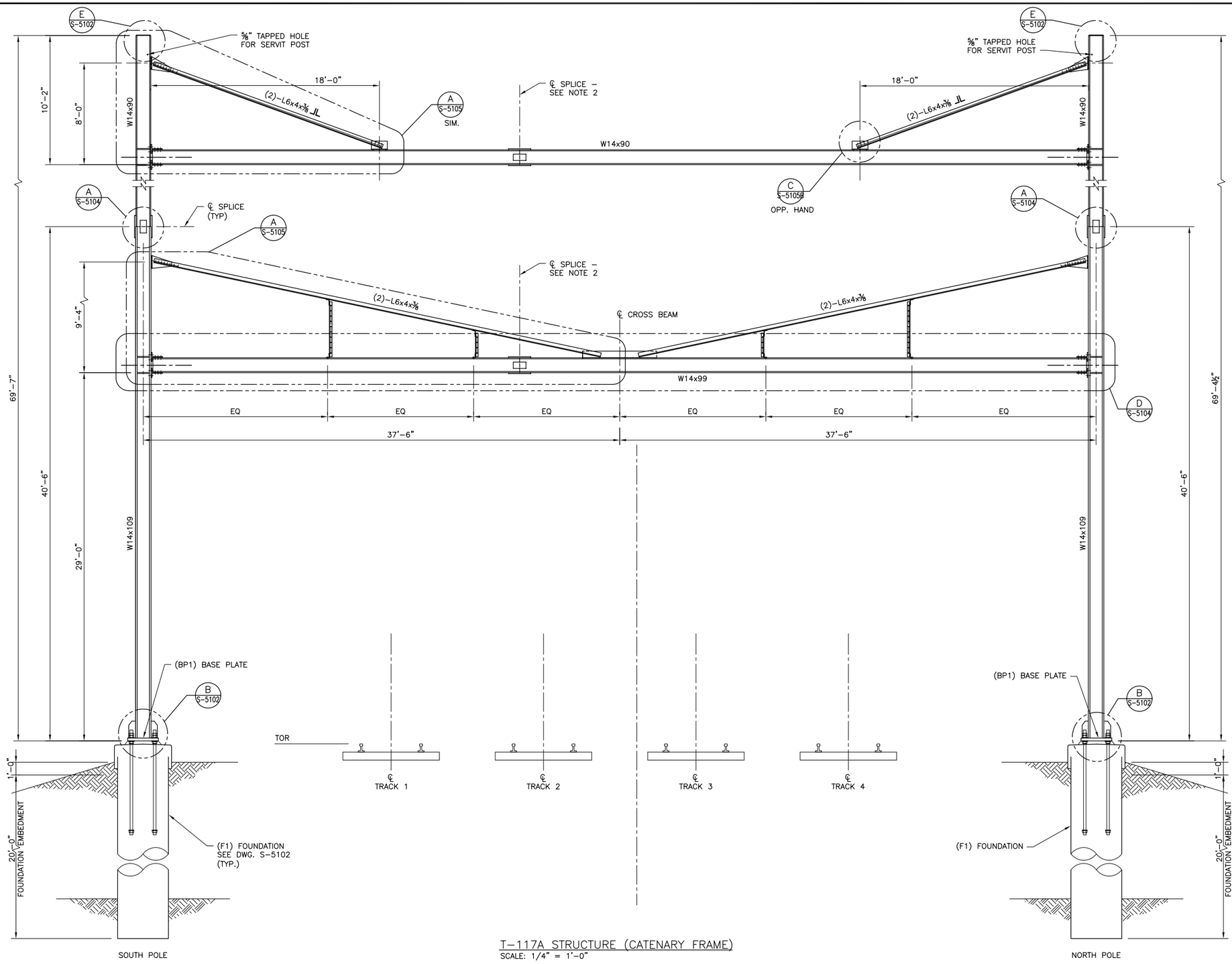
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
TYPICAL CATENARY SAG BRACE (SB)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011–059–S–5105.DWG
Ref. No.:	2011–059
Sheet No:	286 OF 347

S–5105

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NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SUGGESTED SPLICE LOCATION OF CB. CONTRACTOR MAY SUBMIT OTHER LOCATIONS TO SUIT EACH CATENARY FRAME AND SUBMIT FOR APPROVAL.

T-117A STRUCTURE (CATENARY FRAME)
SCALE: 1/4" = 1'-0"
LOOKING WEST

4' 2' 0 4'
SCALE:1/4"= 1'-0"

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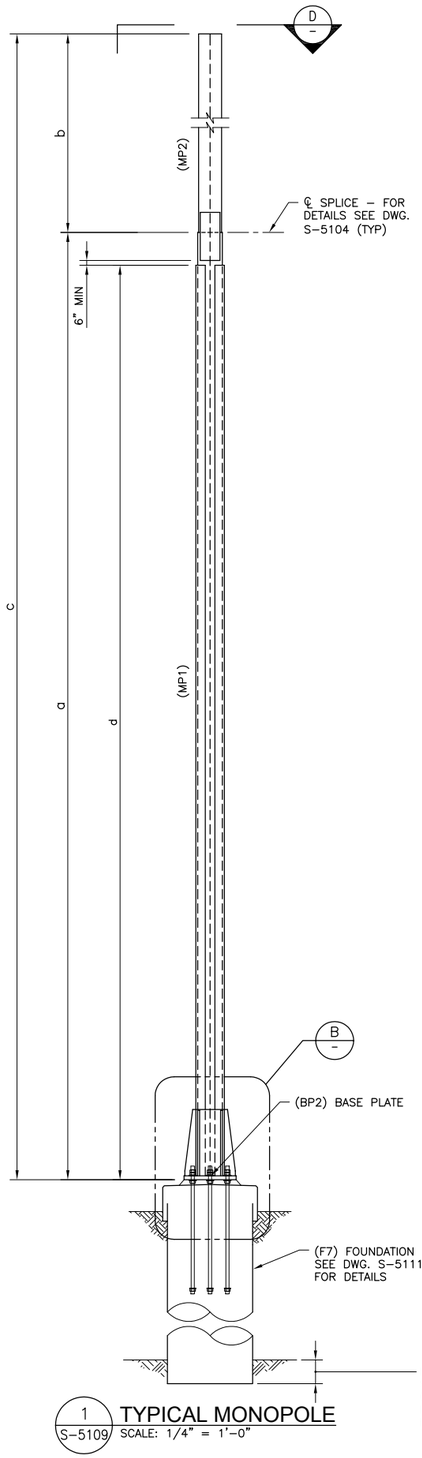
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
T-177A STRUCTURE (CATENARY FRAME)

Recommended: AJT	Drawn: TAB	Checked: MJM	Date: 03/17/16

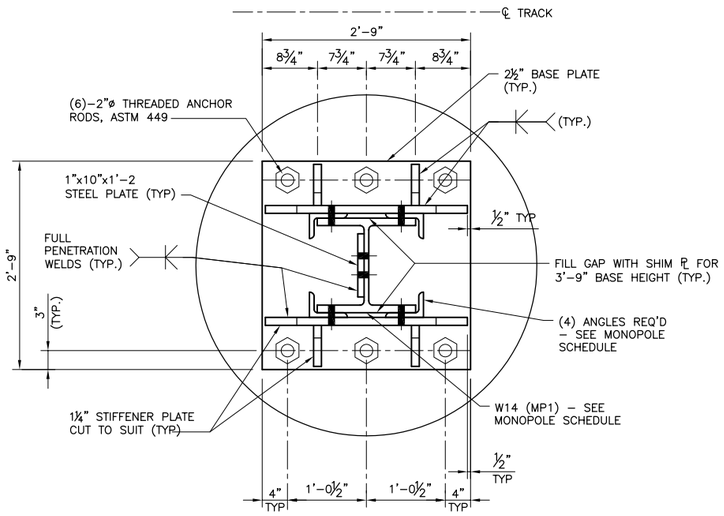
File No.:	2011-059-S-5106.DWG
Ref. No.:	2011-059
Sheet No:	287 OF 347

S-5106

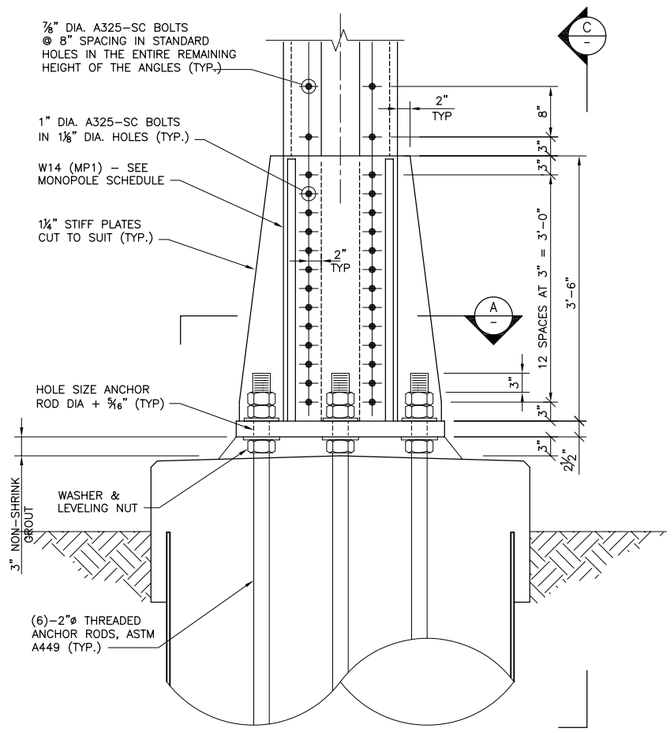
J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5106.dwg
3/14/2016
4:15:41 PM



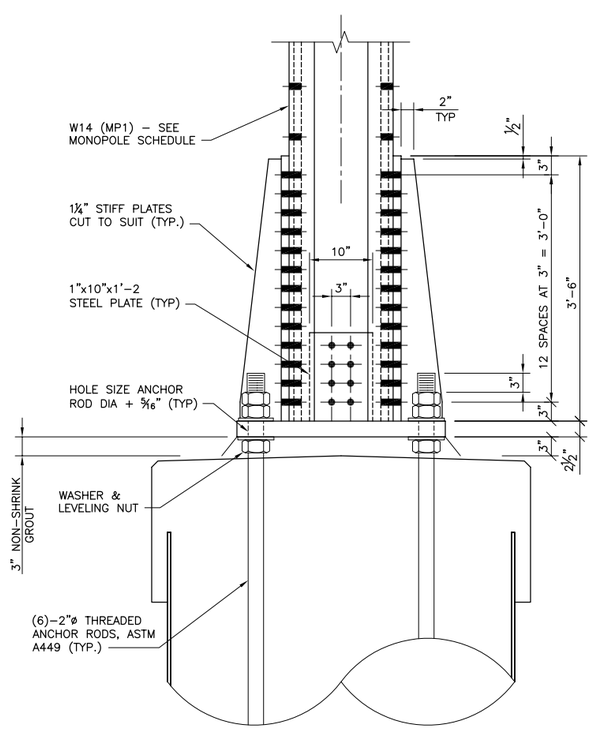
1 S–5109 **TYPICAL MONOPOLE**
SCALE: 1/4" = 1'–0"



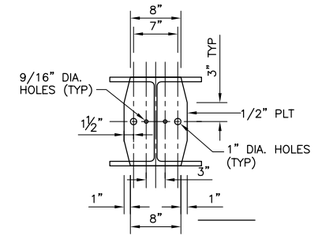
A S–5109 **SECTION**
SCALE: 1" = 1'–0"



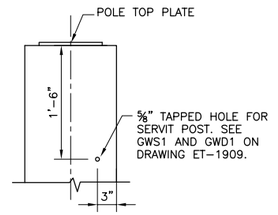
B S–5109 **BASE PLATE DETAIL (BP2)**
SCALE: 1" = 1'–0"



C S–5109 **SECTION**
SCALE: 1" = 1'–0"



D S–5109 **SECTION**
SCALE: 1" = 1'–0"



E S–5109 **SECTION**
SCALE: 1" = 1'–0"

4' 2' 0 4'
SCALE:1/4"= 1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S–5001.
3. FOR CATENARY ID STRUCTURE SEE CATENARY SCHEDULE ON DWGS S–5120, S–5121, AND S–5122.
4. FOR STRUCTURE DIMENSIONS SEE MONOPOLE SCHEDULE THIS DWG. FOR FOUNDATION DETAILS NOT SHOWN SEE DWG. S–5111.

MONOPOLE SCHEDULE

STRUCTURE	DIMENSIONS				POLE (MP1) ANGLES	POLE (MP1)	POLE (MP2)	PIER EXT.	TOP OF FOUND.
	a	b	c	d					
SP–16A	50'–0"	49'–0"	99'–0"	48'–0"	L6x4x¾	W14x159	W14x145	1'–9"	141.00'
SP–17A	50'–0"	48'–10"	98'–10"	48'–0"	L6x4x¾	W14x159	W14x145	1'–0"	144.00'
SP–18A	50'–0"	49'–8"	99'–8"	48'–0"	L6x4x¾	W14x159	W14x145	2'–0"	147.00'
SP–19A	50'–0"	48'–11"	98'–11"	48'–0"	L6x4x¾	W14x145	W14x120	2'–0"	150.00'
SP–20A	50'–0"	39'–5"	89'–5"	48'–0"	L6x4x¾	W14x159	W14x99	0'–9"	153.75'
SP–21A	50'–0"	39'–5¾"	89'–5¾"	48'–0"	L6x4x¾	W14x159	W14x90	1'–0"	155.00'
SP–22A	50'–0"	38'–10½"	88'–10½"	48'–0"	L6x4x¾	W14x145	W14x90	1'–0"	161.00'
SP–23A	50'–0"	40'–10½"	90'–10½"	48'–0"	L6x4x¾	W14x145	W14x90	2'–0"	164.00'

100% DESIGN SUBMISSION

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AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

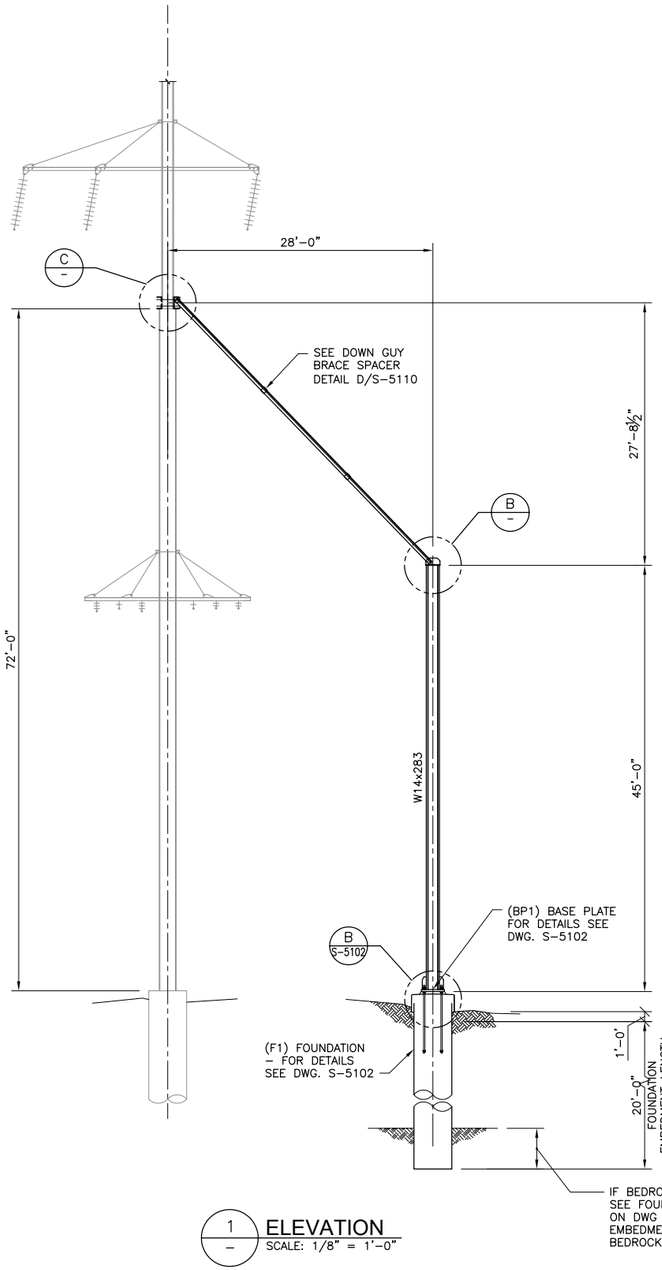
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DRAWINGS
MONOPOLES (MP1 & MP2) – ELEV., SECTIONS & DETAILS

Recommended: AJT	Drawn: TAB	Checked: RW	Date: 03/17/16

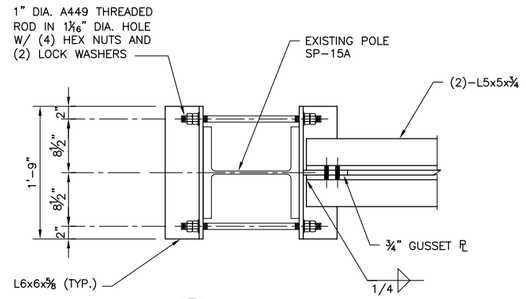
File No.:	2011–059–S–5109.DWG
Ref. No.:	2011–059
Sheet No:	288 OF 347

S–5109

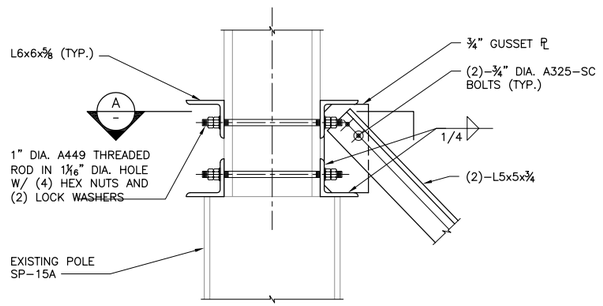
3/14/2016 4:15:46 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5109.dwg



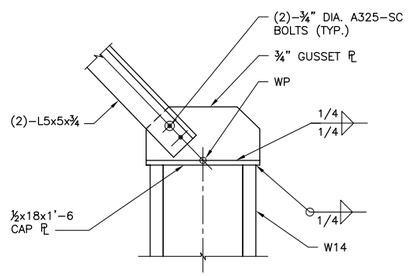
1 / – ELEVATION
SCALE: 1/8" = 1'-0"



A / – SECTION
1" = 1'-0"



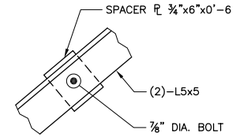
B / – DETAIL
1" = 1'-0"



C / – DETAIL
1" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR STRUCTURE DIMENSIONS AND FOUNDATION DEPTH SEE CATENARY FRAME AND FOUNDATION SCHEDULE DRAWINGS S-5115, S-5116 S-5117, S-5118 AND S-5119.
3. PROVIDE SPACER PL AT THIRD POINTS ALONG LENGTH OF (2)-L5x5 DIAGONAL BRACES.



D / – DOWN GUY BRACE SPACER PLATE DETAIL
N.T.S.

8' 4' 0 8'
SCALE: 1/8"=1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

100% DESIGN SUBMISSION

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30TH Street Station–Philadelphia, Pennsylvania 19104

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Burns
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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
ANCHOR COLUMN FOR EXISTING POLE SP-15A

Recommended: AJT | Drawn: TAB | Checked: MJM | Date: 03/17/16

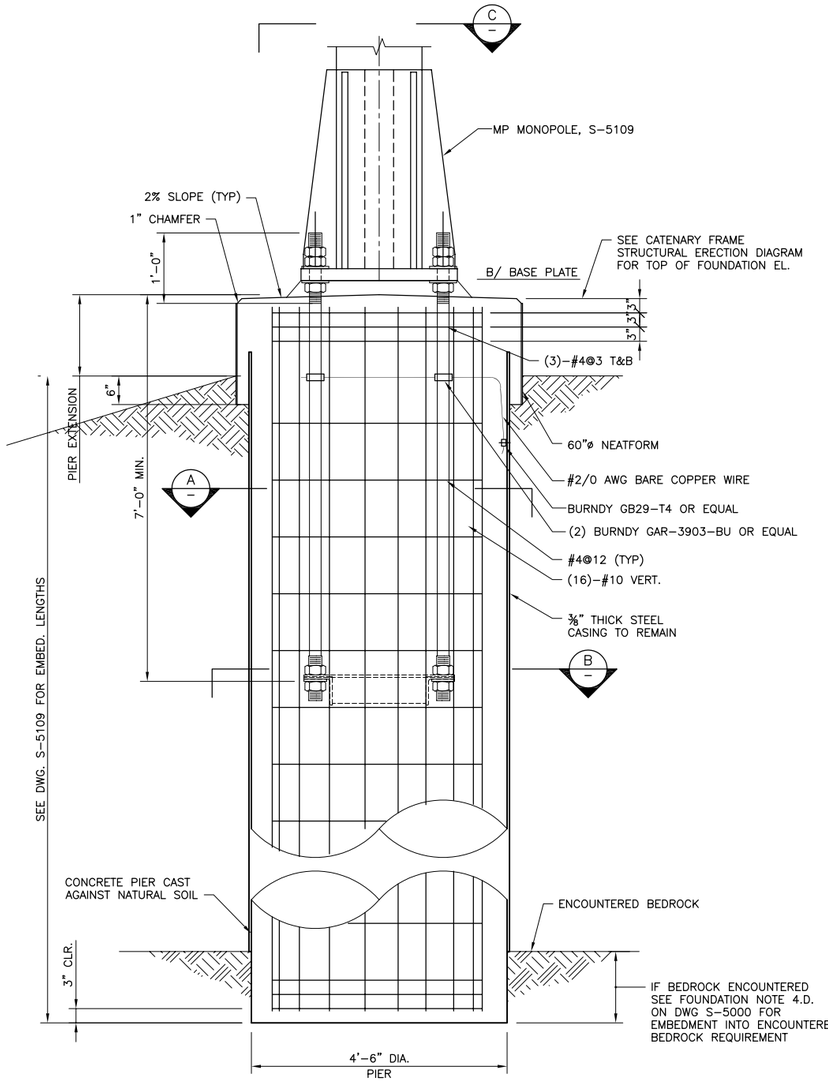
File No.:	2011-059-S-5110.DWG
Ref. No.:	2011-059
Sheet No:	289 OF 347

S-5110

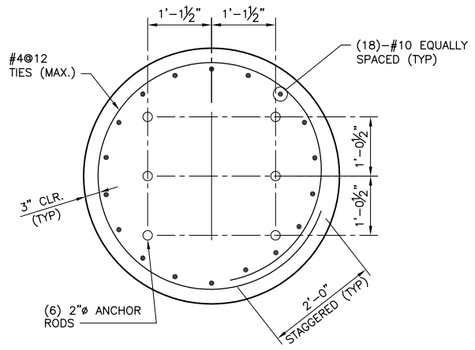
4:15:51 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5110.dwg

NOTES:

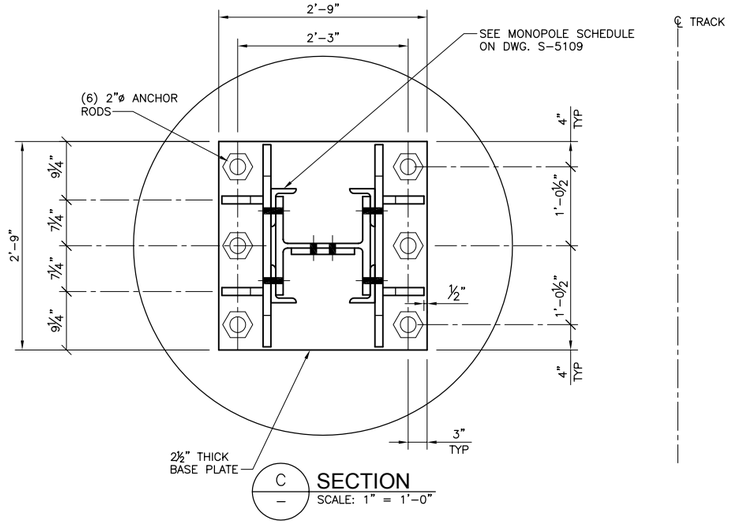
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



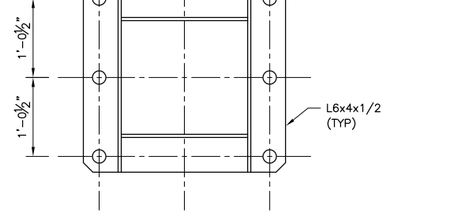
FOUNDATION DETAIL (F7)
SCALE: 3/4" = 1'-0"

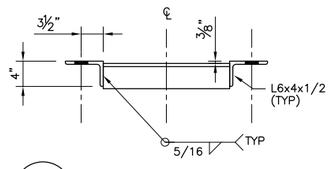


A — SECTION
SCALE: 3/4" = 1'-0"



C — SECTION
SCALE: 1" = 1'-0"





B — ANCHOR PLATE DETAIL
SCALE: 1" = 1'-0"

1' 6" 0 1'
SCALE:3/4"=1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
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Baker

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TYPICAL DRAWINGS
CATENARY FOUNDATION (F7)

File No.:	2011-059-S-5111.DWG
Ref. No.:	2011-059
Sheet No:	290 OF 347

S-5111

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

3/14/2016 4:15:56 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5111.dwg

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. SEE DWG S–5103 FOR TYPICAL CATENARY FRAME.
3. PRE–DRILL COLUMNS FOR FUTURE EXTENSION.

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF(S)	PIER EXT (S)	TOF(N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1206	T-450	W14x109	W14x109	*SEE NOTE 3	(2) L6x4x3/8	W14x99	29'-6"	43'-0"	43'-0"	80'-0"	9'-10 1/2"	29'-6"	43'-0"	43'-0"	550	2'-8"	550	2'-8 1/4"	20'-0"	
ET-1207	T-449	W14x109	W14x109	*SEE NOTE 3	(2) L6x4x3/8	W14x99	29'-9"	45'-0"	45'-0"	85'-0"	10'-6"	29'-9"	45'-0"	45'-0"	549	1'-11 1/2"	549	1'-0"	20'-0"	
ET-1208	T-448	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x109	28'-8"	43'-0"	43'-0"	87'-0"	10'-8 1/2"	28'-8"	43'-0"	80'-8 1/4"	548	3'-0"	548	3'-0"	20'-0"	
ET-1209	T-447	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x109	28'-3"	41'-0"	71'-9"	86'-0"	10'-7"	28'-3"	41'-0"	71'-9"	548	2'-11"	548	4'-0"	20'-0"	
ET-1210	T-446	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x109	28'-8"	44'-0"	72'-2"	86'-0"	10'-7"	28'-8"	44'-0"	72'-2"	545	2'-11 1/4"	545	3'-0"	20'-0"	
ET-1211	T-445	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-8 1/4"	42'-0"	71'-2 1/2"	84'-0"	10'-4"	27'-8 1/4"	42'-0"	71'-2 1/2"	544	3'-2 1/2"	544	3'-5 3/4"	20'-0"	
ET-1212	T-444	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	27'-10 1/2"	42'-0"	76'-4 1/2"	84'-0"	9'-2'	27'-10 1/2"	42'-0"	76'-4 1/2"	541	2'-0"	541	2'-0"	20'-0"	
ET-1215	T-443	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x99	25'-5 1/2"	42'-0"	82'-11 1/2"	85'-0"	10'-5 1/2"	25'-5 1/2"	42'-0"	78'-11 1/2"	541.75	1'-6 3/4"	541.75	1'-9"	20'-0"	
ET-1217	T-440	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14X120	26'-10 1/2"	44'-0"	87'-0"	95'-0"	11'-7"	12'-3"	40'-0"	69'-4 1/2"	539.39	0'-0"	554	0'-0"	20'-0"	
ET-1218	T-438	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	22'-32"	38'-0"	78'-3"	85'-0"	10'-5 1/2"	13'-2 3/4"	29'-0"	64'-3"	543	0'-11"	552	3'-3 3/4"	20'-0"	14'-0"
ET-1219	T-437	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	23'-9 1/2"	40'-0"	66'-3 1/2"	85'-0"	10'-5 1/2"	15'-9 1/2"	32'-0"	66'-3 1/2"	540	3'-7 1/4"	548	1'-6"	20'-0"	
ET-1220	T-436	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x99	26'-1"	40'-0"	78'-7"	80'-0"	9'-10 1/2"	26'-1"	40'-0"	76'-6 3/4"	536	3'-1 1/2"	536	1'-8 1/2"	20'-0"	14'-0"
ET-1222	T-435	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3"	40'-0"	74'-9"	71'-0"	8'-10 1/4"	29'-3"	40'-0"	74'-9"	531	3'-0"	531	1'-3 1/2"	20'-0"	
ET-1224	T-433	W14x120	W14x120	W14x90	(2) L6x4x3/8	W14x90	32'-11"	44'-0"	78'-5"	71'-0"	8'-10 1/4"	29'-11"	41'-0"	75'-5 1/4"	525	1'-7 1/2"	528	1'-5 3/4"	20'-0"	
ET-1225	T-431	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-4 1/2"	43'-0"	76'-10 1/2"	71'-0"	8'-10 1/4"	31'-4 1/2"	43'-0"	75'-0"	525	4'-1 1/2"	525	2'-11 3/4"	20'-0"	
ET-1227	T-430	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-0 3/4"	42'-0"	74'-6 3/4"	71'-0"	8'-10 1/4"	30'-0 3/4"	42'-0"	74'-6 3/4"	526	3'-0"	526	3'-10 1/2"	20'-0"	
ET-1228	T-428	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7"	41'-0"	75'-1"	72'-0"	8'-11 3/4"	31'-7"	45'-0"	70'-1"	524	2'-4 1/4"	522	4'-2 3/7"	20'-0"	
ET-1229	T-427	W14x145	W14x145	W14x90	(2) L6x6x3/8	W14x90	31'-8 1/2"	44'-0"	75'-2 1/2"	71'-0"	8'-10 1/4"	31'-8 1/2"	44'-0"	60'-2 1/2"	523	2'-0"	523	5'-4"	20'-0"	14'-0"
ET-1230	T-426	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-2"	41'-0"	74'-8"	68'-0"	8'-6 1/4"	30'-2"	41'-0"	59'-8"	523	3'-0"	523	7'-7 1/4"	18'-0"	
ET-1231	T-425	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4 1/2"	40'-0"	74'-4 1/4"	68'-0"	8'-6 1/4"	29'-4 1/2"	40'-0"	59'-4 1/4"	523	1'-0"	523	3'-4"	18'-0"	
ET-1232	T-424	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10"	43'-0"	74'-4"	68'-0"	8'-6 1/4"	28'-10"	43'-0"	59'-4"	523	1'-8 3/4"	523	4'-0"	18'-0"	
ET-1233	T-423	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-7"	38'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-7"	41'-0"	59'-1"	526	2'-6 3/4"	523	1'-1"	20'-0"	
ET-1235	T-422	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	25'-8"	40'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-8"	40'-0"	59'-1"	526	2'-6 3/4"	523	2'-1"	20-0"	14'-0"
ET-1236	T-420	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-6"	40'-0"	72'-0"	68'-0"	8'-6 1/4"	30'-6"	41'-0"	61'-0"	525	1'-1 1/4"	521	2'-7 3/4"	20'-0"	
ET-1237	T-419	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-6"	40'-0"	71'-11 3/4"	70'-0"	8'-9"	28'-6"	41'-0"	58'-11 3/4"	525	3'-7 3/4"	523	3'-0"	20'-0"	
ET-1238	T-418	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-7"	40'-0"	71'-1"	71'-0"	8'-10 1/4"	28'-7"	40'-0"	59'-1"	526	2'-6 3/4"	523	2'-1"	20'-0"	
ET-1239	T-417	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-7"	40'-0"	72'-1"	71'-0"	8'-10 1/4"	30'-7"	41'-0"	61'-1"	525	1'-4 1/4"	521	2'-0"	18'-0"	
ET-1240	T-416	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-6 1/2"	40'-0"	73'-0 1/2"	71'-0"	8'-10 1/4"	27'-6 1/2"	40'-0"	58'-0 1/2"	524	3'-0"	524	2'-1 1/2"	18'-0"	
ET-1241	T-415	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-6 3/4"	40'-0"	75'-0 3/4"	71'-0"	8'-10 1/4"	29'-6 3/4"	40'-0"	60'-0 3/4"	522	0'-10 3/4"	522	1'-6"	20'-0"	
ET-1242	T-414	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-2 1/2"	40'-0"	69'-8 1/2"	71'-0"	8'-10 1/4"	29'-2 1/2"	40'-0"	59'-8 1/2"	522	3'-7 3/4"	522	2'-0"	20-0"	
ET-1243	T-413	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10 1/4"	40'-0"	65'-4 1/4"	71'-0"	8'-10 1/4"	28'-10 1/4"	40'-0"	65'-4 1/4"	522	5'-4 1/4"	522	2'-9"	20'-0"	
ET-1244	T-412	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	30'-8"	41'-0"	61'-8"	72'-0"	8'-11 3/4"	28'-8"	40'-0"	59'-8"	520	3'-10 3/4"	522	3'-0"	20'-0"	
ET-1245	T-411	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-0"	40'-0"	58'-6"	71'-0"	8'-10 1/4"	28'-0"	40'-0"	58'-6"	523	4'-0"	523	2'-0"	20'-0"	
ET-1246	T-410	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-9"	41'-0"	57'-3/4"	71'-0"	8'-10 1/4"	23'-9"	38'-0"	54'-3 1/4"	524	3'-1"	527	4'-4 1/2"	20'-0"	
ET-1247	T-409	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	23'-5"	38'-0"	53'-11 1/2"	71'-0"	8'-10 1/4"	23'-5"	38'-0"	53'-11 1/2"	527	5'-5 1/4"	527	3'-11 3/4"	20'-0"	
ET-1248	T-408	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-5 1/2"	40'-0"	64'-5 1/2"	71'-0"	8'-10 1/4"	26'-5 1/2"	40'-0"	64'-5 1/2"	524	3'-6 1/2"	524	4'-0 3/4"	20'-0"	
ET-1249	T-407	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-2"	41'-0"	74'-0 1/4"	72'-0"	8'-11 3/4"	29'-2"	41'-0"	74'-0 1/4"	520	1'-0"	520	1'-0"	20'-0"	
ET-1250	T-406	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-7 1/2"	40'-0"	74'-7 1/2"	72'-0"	8'-11 3/4"	28'-7 1/2"	40'-0"	74'-7 1/2"	518	3'-0"	518	3'-0"	20'-0"	
ET-1251	T-405	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	68'-0"	72'-0"	8'-11 3/4"	29'-0"	40'-0"	68'-0"	516	2'-0"	516	2'-0"	20'-0"	
ET-1252	T-404	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 1/2"	40'-0"	67'-3 3/4"	72'-0"	8'-11 3/4"	28'-3 1/2"	40'-0"	67'-3 3/4"	515	3'-0"	515	4'-0"	20'-0"	
ET-1253	T-403	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	67'-6"	72'-0"	8'-11 3/4"	28'-6"	40'-0"	67'-6"	513	5'-10"	513	4'-2"	20'-0"	
ET-1255	T-402	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	41'-0"	76'-3"	72'-0"	8'-11 3/4"	30'-3"	41'-0"	76'-3"	510	3'-11 1/2"	510	2'-0"	20'-0"	
ET-1256	T-400	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-9 1/2"	39'-0"	72'-9 1/2"	71'-0"	8'-10 1/4"	28'-9 1/2"	41'-0"	74'-9 1/2"	512	2'-6"	510	3'-0"	20'-0"	
ET-1257	T-399	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 3/4"	40'-0"	71'-3 3/4"	71'-0"	8'-10 1/4"	25'-3 3/4"	40'-0"	68'-3 3/4"	509	3'-0"	512	3'-2"	20'-0"	
ET-1258	T-398	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-1 3/4"	40'-0"	68'-7 3/4"	71'-0"	8'-10 1/4"	26'-1 3/4"	40'-0"	68'-7 3/4"	510	3'-0"	510	3'-6 1/4"	20'-0"	
ET-1259	T-397	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	22'-5 1/2"	40'-0"	75'-10 3/4"	71'-0"	8'-10 1/4"	22'-5 1/2"	40'-0"	75'-10 3/4"	509	3'-11"	509	4'-3"	20'-0"	7'-0"
ET-1260	T-396	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	18'-2 3/4"	N/A	32'-2 1/2"	69'-0"	8'-7 1/2"	21'-2 3/4"	N/A	35'-2 1/2"	510	4'-6 1/2"	507	1'-0"	18'-0"	
ET-1261	T-395	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	17'-11"	40'-0"	75'-11"	69'-0"	8'-7 1/2"	17'-11"	40'-0"	75'-11"	510	4'-0"	510	3'-2 1/4"	20'-0"	7'-0"
ET-1262	T-394	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-3"	40'-0"	75'-3"	71'-0"	8'-10 1/4"	23'-3"	40'-0"	75'-3"	508	2'-0"	508	2'-10"	20'-0"	
ET-1263	T-393	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	22'-9"	40'-0"	70'-9"	71'-0"	8'-10 1/4"	22'-9"	40'-0"	70'-9"	507	2'-3 1/2"	507	2'-0"	20-0"	
ET-1265	T-392	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-11 3/4"	40'-0"	69'-0 1/4"	71'-0"	8'-10 1/4"	21'-11 3/4"	40'-0"	69'-0 1/4"	505	1'-11"	505	3'-8"	18'-0"	
ET-1266	T-390	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-5"	40'-0"	71'-0 3/4"	71'-0"	8'-10 1/4"	27'-5"	40'-0"	71'-0 3/4"	499	2'-0"	499	1'-0"	20'-0"	
ET-1267	T-389	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	24'-11 1/4"	40'-0"	77'-5 1/4"	72'-0"	8'-11 3/4"	22'-11 1/4"	40'-0"	60'-5 1/4"	497	3'-0"	499	2'-0"	20'-0"	
ET-1268	T-388	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	25'-4 1/4"	42'-0"	74'-10 1/4"	71'-0"	8'-10 1/4"	24'-4 1/4"	42'-0"	58'-10 1/4"	497	4'-0"	498	2'-0"	20'-0"	
ET-1269	T-387	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	27'-2"	40'-0"	80'-10"	69'-0"	8'-7 1/2"	21'-2"	40'-0"	63'-1 1/2"	495	2'-0"	501	2'-9 1/2"	20'-0"	
ET-1270	T-386	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	26'-10 3/4"	40'-0"	76'-4 3/4"	69'-0"	8'-7 1/2"	21'-10 3/4"	40'-0"	71'-4 3/4"	494	2'-0"	499	2'-0"	20'-0"	
ET-1271	T-385	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	27'-1 1/4"	42'-0"	76'-7 1/4"	68'-0"	8'-6 1/4"	24'-1 1/4"	40'-0"	73'-7 1/4"	493	2'-0"	496	1'-0"	20'-0"	
ET-1272	T-384	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x99	25'-2 1/4"	40'-0"	74'-8 1/4"	68'-0"	8'-6 1/4"	25'-2 1/4"	40'-0"	74'-8 1/4"	494	4'-0"	494	2'-0"	20'-0"	
ET-1273	T-383	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x99	24'-11 1/2"	40'-0"	74'-5 1/2"	68'-0"	8'-6 1/4"	24'-11 1/2"	40'-0"	74'-5 1/2"	493	4'-0"	493	3'-0"	20'-0"	
ET-1274	T-382	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3 3/4"	40'-0"	74'-9"	69'-0"	8'-7 1/2"	28'-3 3/4"	40'-0"	74'-9"	491	3'-11 1/2"	491	3'-0"	20'-0"	

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (1 OF 5)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

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Ref. No.:	2011–059
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S–5115

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S–5000.
2. SEE DWG S–5103 FOR TYPICAL CATENARY FRAME.

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1275	T-381	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-6 1/2"	41'-0"	77'-0 1/2"	71'-0"	8'-10 1/4"	25'-6 1/2"	40'-0"	72'-0 1/2"	487	2'-0"	492	2'-11 1/4"	20'-0"	
ET-1276	T-380	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 1/2"	40'-0"	74'-2 1/2"	71'-0"	8'-10 1/4"	24'-2 1/2"	40'-0"	70'-2 1/2"	488	2'-11 1/2"	492	3'-3"	20'-0"	
ET-1277	T-379	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-5 1/4"	40'-0"	74'-5 1/4"	71'-0"	8'-10 1/4"	24'-5 1/4"	40'-0"	70'-5 1/4"	486	2'-3 3/4"	490	4'-0 3/4	20'-0"	
ET-1278	T-378	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-8 1/4"	40'-0"	67'-8 1/4"	71'-0"	8'-10 1/4"	29'-8 1/4"	40'-0"	67'-8 1/4"	484	3'-6 1/2"	484	2'-6"	20'-0"	
ET-1279	T-377	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1"	40'-0"	62'-1"	71'-0"	8'-10 1/4"	29'-1"	40'-0"	62'-1"	480	3'-7 1/4"	480	4'-10"	20'-0"	
ET-1280	T-376	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-6 3/4"	40'-0"	56'-6 3/4"	71'-0"	8'-10 1/4"	21'-6 3/4"	40'-0"	53'-6 3/4"	484	3'-0"	487	3'10 3/4"	20'-0"	
ET-1281	T-375	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-11"	40'-0"	56'-11"	71'-0"	8'-10 1/4"	22'-11"	40'-0"	54'-11"	482	1'-6 1/4"	484	2'-1 1/2"	20'-0"	
ET-1282	T-374	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-8 1/4"	40'-0"	57'-8 1/4"	72'-0"	8'-11 3/4"	25'-8 1/4"	40'-0"	57'-8 1/4"	479	4'-0"	479	1'-0"	20'-0"	
ET-1283	T-373	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-5 3/4"	40'-0"	61'-5 3/4"	72'-0"	8'-11 3/4"	29'-5 3/4"	40'-0"	61'-5 3/4"	473	3'-11 1/4"	473	2'-0"	20'-0"	
ET-1284	T-372	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-1 1/4"	42'-0"	62'-1 1/4"	71'-0"	8'-10 1/4"	31'-1 1/4"	44'-0"	62'-1 1/4"	470	3'-7 1/4"	470	1'-0"	20'-0"	
ET-1285	T-371	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-7 1/2"	40'-0"	59'-7 1/2"	71'-0"	8'-10 1/4"	28'-7 1/2"	40'-0"	59'-7 1/2"	470	4'-7 1/4"	470	3'-0"	18'-0"	
ET-1286	T-370	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-7 3/4"	43'-0"	62'-7 3/4"	71'-0"	8'-10 1/4"	31'-7 3/4"	43'-0"	62'-7 3/4"	465	3'-4"	465	1'-8 3/4"	18'-0"	
ET-1287	T-369	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	71'-0"	8'-10 1/4"	29'-0"	40'-0"	60'-0"	466	1'-0"	466	1'-0"	18'-0"	
ET-1288	T-368	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/2"	40'-0"	58'-2 1/2"	71'-0"	8'-10 1/4"	24'-2 1/2"	40'-0"	55'-2 1/2"	466	3'-0"	469	5'-8 1/2'	20'-0"	
ET-1289	T-367	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-9 1/2"	41'-0"	69'-9 1/2"	71'-0"	8'-10 1/4"	21'-9 1/2"	40'-0"	62'-9 1/2"	463	1'-11 1/4"	470	3'-10 1/4"	20'-0"	
ET-1290	T-366	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	27'-2 1/4"	40'-0"	79'-2 1/4"	68'-0"	8'-6 1/4"	23'-2 1/4"	40'-0"	75'-2 1/4"	462	2'-0"	466	2'-9 1/2"	20'-0"	7'-0"
ET-1291	T-365	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	22'-4 3/4"	N/A	34'-0"	71'-0"	8'-10 1/4"	17'-4 3/4"	N/A	29'-0"	461	2'-0"	466	3'-3"	18'-0"	
ET-1292	T-364	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	25'-6 1/4"	40'-0"	78'-6 1/4"	71'-0"	8'-10 1/4"	20'-6 1/4"	40'-0"	78'-6 1/4"	461	2'-0"	466	3-3"	20'-0"	7'-0"
ET-1293	T-363	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	26'-9"	40'-0"	68'-9"	72'-0"	8'-11 3/4"	26'-9"	40'-0"	83'-9"	459	4'-0"	459	2'-0"	20'-0"	
ET-1294	T-362	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1 1/2"	42'-0"	60'-1 1/2"	72'-0"	8'-11 3/4"	29'-1 1/2"	42'-0"	70'-1 1/2"	456	4'-0"	456	2'-0"	18'-0"	
ET-1295	T-361	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-1 3/4"	41'-0"	59'-7 3/4"	71'-0"	8'-10 1/4"	29'-1 3/4"	41'-0"	59'-7 3/4"	455	3'-0"	455	1'-9 1/2"	18'-0"	
ET-1296	T-360	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/4"	42'-0"	59'-9 1/4"	71'-0"	8'-10 1/4"	29'-3 1/4"	42'-0"	59'-9 1/4"	453	4'-0"	453	2'-0"	18'-0"	
ET-1297	T-359	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-11"	41'-0"	59'-11"	71'-0"	8'-10 1/4"	26'-11"	40'-0"	65'-11"	451	3'-0"	453	2'-0"	20'-0"	
ET-1298	T-358	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-11 3/4"	39'-0"	59'-5 3/4"	68'-0"	8'-6 1/4"	25'-11 3/4"	40'-0"	72'-5 3/4"	450	3'-4"	452	2'-0"	18'-0"	
ET-1299	T-357	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-3"	40'-0"	59'-9"	68'-0"	8'-6 1/4"	28'-3"	40'-0"	74'-9"	448.23	3'-6 3/4"	448.23	1'-2 3/4"	18'-0"	
ET-1300	T-356	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-4 3/4"	40'-0"	59'-4 3/4"	68'-0"	8'-6 1/4"	27'-4 3/4"	40'-0"	67'-4 3/4"	447	3'-0"	447	3'-0"	20'-0"	
ET-1301	T-355	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-8 1/4"	40'-0"	59'-8 1/4"	71'-0"	8'-10 1/4"	28'-8 1/4"	40'-0"	59'-8 1/4"	445	3'-0"	445	2'-9"	20'-0"	
ET-1302	T-354	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-9 3/4"	40'-0"	59'-9 3/4"	71'-0"	8'-10 1/4"	28'-9 3/4"	40'-0"	59'-9 3/4"	443	4'-0"	443	1'-10"	20'-0"	
ET-1303	T-353	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	72'-0"	8'-11 3/4"	29'-0"	40'-0"	60'-0"	441	4'-0"	441	0'-8"	18'-0"	
ET-1304	T-352	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0"	40'-0"	60'-0"	72'-0"	8'-11 3/4"	27'-0"	40'-0"	58'-0"	439	3'-0"	441	1'-0"	18'-0"	
ET-1305	T-351	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-6 3/4"	40'-0"	59'-10 3/4"	71'-0"	8'-10 1/4"	28'-6 3/4"	40'-0"	59'-10 3/4"	437	4'-2 1/4"	437	0'-10 1/2"	20'-0"	
ET-1306	T-350	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-4 1/4"	40'-0"	59'-8 1/2"	71'-0"	8'-10 1/4"	26'-4 1/4"	40'-0"	59'-8 1/2"	435	2'-9"	435	2'-6"	20'-0"	
ET-1307	T-349	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	28'-2 1/2"	N/A	43'-9"	73'-0"	9'-1"	28'-2 1/2"	N/A	43'-9"	432	2'-0"	432	4'-0"	18'-0"	
ET-1308	T-348	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4"	40'-0"	69'-8 1/4"	71'-0"	8'-10 1/4"	29'-4"	40'-0"	69'-8 1/4"	431	5'-0"	431	5'-3 1/2"	20'-0"	
ET-1309	T-347	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-1 1/2"	40'-0"	74'-1 1/2"	71'-0"	8'-10 1/4"	28'-1 1/2"	40'-0"	74'-1 1/2"	432	4'-0"	432	3'-0"	20'-0"	
ET-1310	T-346	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-4"	40'-0"	74'-10"	71'-0"	8'-10 1/4"	29'-4"	40'-0"	74'-10"	430	4'-0"	430	3'-0"	20'-0"	
ET-1311	T-345	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7 1/4"	40'-0"	75'-1 1/4"	72'-0"	8'-11 3/4"	29'-7 1/4"	40'-0"	75'-1 1/4"	428	4'-8 1/4"	428	4'-0"	20'-0"	
ET-1312	T-344	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	43'-0"	76'-3"	72'-0"	8'-11 3/4"	30'-3"	43'-0"	76'-3"	425	3'-0"	425	4'-0"	20'-0"	
ET-1313	T-343	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-10 3/4"	42'-0"	74'-11 3/4"	72'-0"	8'-11 3/4"	29'-10 3/4"	42'-0"	74'-11 3/4"	425	5'-0"	425	4'-0"	20'-0"	
ET-1314	T-342	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-10 3/4"	40'-0"	70'-4 1/4"	72'-0"	8'-11 3/4"	28'-10 3/4"	40'-0"	70'-4 1/4"	425	5-11 1/2"	425	3'-11 1/2"	20'-0"	
ET-1315	T-341	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-4 1/2"	42'-0"	71'-10 1/2"	72'-0"	8'-11 3/4"	29'-4 1/2"	42'-0"	70'-0"	422	2'-0"	422	3'-0"	20'-0"	
ET-1315A	T-340	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	29'-6 1/4"	41'-0"	84'-3"	71'-0"	8'-10 1/4"	29'-6 1/4"	41'-0"	79'-3"	421	1'-0 1/4"	421	4'-0"	20'-0"	7'-0"
ET-1317	T-339A	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	23'-11 1/4"	N/A	37'-4"	71'-0"	8'-10 1/4"	26'-11 1/4"	N/A	40'-4"	422	2'-0"	419	2'-0"	18'-0"	
ET-1317A	T-338	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	25'-6"	40'-0"	81'-6"	71'-0"	8'-10 1/4"	25'-6"	40'-0"	76'-6"	422	2'-0"	422	3'-0"	20'-0"	7'-0"
ET-1318	T-337A	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	23'-11 1/4"	N/A	35'-11 1/4"	71'-0"	8'-10 1/4"	26'-11 1/4"	N/A	38'-11 1/4"	422	2'-8 3/4"	419	2'-0"	18'-0"	
ET-1319	T-337	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 3/4"	40'-0"	75'-0 3/4"	71'-0"	8'-10 1/4"	28'-2 3/4"	40'-0"	70'-0 3/4"	419	1'-0"	419	3'-0"	20'-0"	
ET-1321	T-336	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/2"	40'-0"	69'-8 1/2"	71'-0"	8'-10 1/4"	27'-2 1/2"	40'-0"	69'-8 1/2"	418	1'-11 1/4"	418	3'-0"	18'-0"	
ET-1322	T-334	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-7 3/4"	40'-0"	71'-1 3/4"	71'-0"	8'-10 1/4"	28'-7 3/4"	40'-0"	71'-1 3/4"	415	1'-11 1/4"	415	2'-11 3/4"	18'-0"	
ET-1323	T-333	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-0 1/4"	40'-0"	67'-7 3/4"	71'-0"	8'-10 1/4"	29'-0 1/4"	40'-0"	67'-7 3/4"	413	5'-0"	413	3'-0"	18'-0"	
ET-1324	T-332	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	30'-11 1/2"	45'-0"	62'-11 1/2"	72'-0"	8'-11 3/4"	30'-11 1/2"	45'-0"	62'-11 1/2"	408	3'-0"	408	3'-9 1/4"	18'-0"	
ET-1325	T-331	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-5"	42'-0"	63'-11"	72'-0"	8'-11 3/4"	30'-5"	42'-0"	63'-11"	405	2'-6 3/4"	405	3'-0"	20'-0"	
ET-1327	T-330	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-5"	43'-0"	60'-11"	71'-0"	8'-10 1/4"	28'-5"	43'-0"	60'-11"	406	2'-11 1/4"	406	2'-5"	20'-0"	
ET-1328	T-328	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-9 1/2"	43'-0"	60'-9 1/2"	72'-0"	8'-11 3/4"	29'-9 1/2"	43'-0"	60'-9 1/2"	403	1'-0"	403	3'-0"	18'-0"	
ET-1329	T-327	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-6 1/2"	40'-0"	59'-6 1/2"	72'-0"	8'-11 3/4"	28'-6 1/2"	40'-0"	59'-6 1/2"	403	3'-0"	403	2'-0"	18'-0"	
ET-1330	T-326	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-6 3/4"	40'-0"	59'-6 3/4"	71'-0"	8'-10 1/4"	28'-6 3/4"	40'-0"	59'-6 3/4"	402	3'-0"	402	2'-0"	18'-0"	
ET-1331	T-325	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-3"	41'-0"	60'-5 1/2"	71'-0"	8'-10 1/4"	29'-3"	41'-0"	60'-5 1/2"	400	3'-0"	400	3'-8 3/4"	18'-0"	
ET-1332	T-324	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-7"	43'-0"	62'-7"	71'-0"	8'-10 1/4"	31'-7"	43'-0"	62'-7"	397	2'-9"	397	3'-8 3/4"	18'-0"	
ET-1333	T-323	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-1 1/4"	43'-0"	69'-11 1/2"	71'-0"	8'-10 1/4"	31'-1 1/4"	43'-0"	61'-11 1/2"	397	4'-11 1/4"	397	1'-6"	18'-0"	
ET-1334	T-322	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	74'-9	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	399	3'-9 1/2"	399	3'-0"	18'-0"	
ET-1335	T-321	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	75'-0"	71'-0"	8'-10 1/4"	28'-6"	40'-0"	59'-6"	399	4'-3 1/2"	399	3'-0"	18'-0"	
ET-1336	T-320	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-6"	40'-0"	67'-6"	71'-0"	8'-10 1/4"	28'-6"	40'-0"	59'-6"	399	3'-0"	399	2'-0"	18'-0"	
ET-1337	T-319	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-2"	40'-0"	58'-2"	71'-0"	8'-10 1/4"	27'-2"	40'-0"	58'-2"	400	4'-0"	400	3'-0"	18'-0"	
ET-1338	T-318	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'	40'-0"	59'-0"	71'-0"	8'-10 1/4"	28'	40'-0"	59'-0"	399	3'-0"	399	3'-0"	18'-0"	

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STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (2 OF 5)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5116.DWG
Ref. No.:	2011–059
Sheet No:	292 OF 347

S–5116

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ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1339	T-317	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	26'-11 3/4"	40'-0"	57'-11 3/4"	71'-0"	8'-10 1/4"	26'-11 3/4"	40'-0"	57'-11 3/4"	400	5'-0"	400	3'-0"	18'-0"	
ET-1340	T-316	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x99	26'-9 3/4"	40'-0"	57'-9 3/4"	84'-0"	10'-4"	26'-9 3/4"	40'-0"	57'-9 3/4"	400	3'-0"	400	3'-0"	20'-0"	
ET-1341	T-315	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	27'-11"	40'-0"	58'-11"	71'-0"	8'-10 1/4"	23'-11"	40'-0"	54'-11"	399	2'-0"	403	4'-8 3/4"	20'-0"	
ET-1342	T-314	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-8 1/4"	40'-0"	56'-2 3/4"	71'-0"	8'-10 1/4"	25'-8 1/4"	40'-0"	56'-2 3/4"	402	3'-8 1/2"	402	3'-0"	18'-0"	
ET-1343	T-313	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-6"	40'-0"	55'-6"	71'-0"	8'-10 1/4"	24'-6"	40'-0"	55'-6"	403	3'-0"	403	4'-0"	18'-0"	
ET-1344	T-312	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	24'-6 1/2"	40'-0"	56'-6 1/2"	72'-0"	8'-11 3/4"	24'-6 1/2"	40'-0"	56'-6 1/2"	402	4'-0"	402	3'-0"	18'-0"	
ET-1345	T-311	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-6"	40'-0"	59'-0"	73'-0"	9'-1"	25'-6"	40'-0"	59'-0"	400	2'-0"	400	1'-8 1/4"	20'-0"	
ET-1346	T-310	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-3"	40'-0"	59'-9"	74'-0"	9'-2 1/2"	26'-3"	40'-0"	59'-9"	399	4'-4 1/4"	399	2'-0 1/4"	20'-0"	
ET-1347	T-309	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-3"	40'-0"	59'-2 1/2"	75'-0"	9'-4"	26'-3"	40'-0"	59'-2 1/2"	400	4'-1"	400	5'-0"	20'-0"	
ET-1348	T-308	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	26'-1 3/4"	40'-0"	60'-0"	76'-0"	9'-5 1/2"	26'-1 1/2"	40'-0"	60'-0"	399	6'-4 1/2"	399	3'-0"	20'-0"	
ET-1349	T-307	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	26'-2"	40'-0"	59'-2"	75'-0"	9'-4"	26'-2"	40'-0"	59'-2"	400	7'-3 3/4"	400	3'-0"	18'-0"	
ET-1350	T-306	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-5 3/4"	40'-0"	60'-5 3/4"	74'-0"	9'-2 1/2"	27'-5 3/4"	40'-0"	58'-5 3/4"	400	3'-0"	402	2'-0"	20'-0"	
ET-1352	T-305	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-1 1/4"	40'-0"	69'-10 3/4"	73'-0"	9'-1"	26'-1 1/4"	40'-0"	69'-10 3/4"	405	4'-0"	405	2'-0"	20'-0"	
ET-1353	T-303	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/2"	42'-0"	60'-9 1/2"	72'-0"	8'-11 3/4"	27'-3 1/2"	40'-0"	58'-9 1/2"	404	4'-0"	406	2'-10 1/2"	20'-0"	
ET-1354	T-302	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-7"	42'-0"	61'-7"	72'-0"	8'-11 3/4"	29'-7"	42'-0"	61'-7"	405	4'-0"	405	1'-10 1/2"	18'-0"	
ET-1355	T-301	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-9"	41'-0"	59'-9"	72'-0"	8'-11 3/4"	29'-9"	41'-0"	59'-9"	407.61	3'-7 1/4"	407.61	1'-7 1/4"	20'-0"	
ET-1356	T-300	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	28'-10 1/2"	42'-0"	59'-10 1/2"	80'-0"	9'-10 1/2"	28'-10 1/2"	42'-0"	59'-10 1/2"	409	8'-0 1/4"	409	4'-5 1/4"	20'-0"	
ET-1357	T-299	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	28'-4 1/2"	41'-0"	58'-9 3/4"	83'-0"	10'-2 1/2"	28'-4 1/2"	41'-0"	58'-9 3/4"	412	3'-5 3/4"	412	3'-0"	20'-0"	
ET-1358	T-298	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	26'-7 3/4"	40'-0"	57'-8 1/2"	71'-0"	8'-10 1/4"	26'-7 3/4"	40'-0"	57'-8 1/2"	415	2'-0"	415	2'-0"	20'-0"	
ET-1359	T-297	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-3 1/2"	40'-0"	55'-3 1/2"	71'-0"	8'-10 1/4"	24'-3 1/2"	40'-0"	55'-3 1/2"	419	4'-9 1/4"	419	4'-10 1/4"	18'-0"	
ET-1360	T-296	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	25'-5 1/4"	40'-0"	56'-10 1/4"	71'-0"	8'-10 1/4"	25'-5 1/4"	40'-0"	56'-10 1/4"	419	3'-0"	419	2'-0"	18'-0"	
ET-1361	T-295	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-5 3/4"	40'-0"	68'-5 3/4"	71'-0"	8'-10 1/4"	26'-5 3/4"	40'-0"	68'-5 3/4"	419	2'-0"	419	2'-0"	20'-0"	
ET-1363	T-294	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	27'-9"	40'-0"	84'-9"	72'-0"	8'-11 3/4"	27'-9"	40'-0"	84'-9"	419.06	5'-0 1/4"	419.06	3'-0 1/4"	20'-0"	
ET-1365	T-292	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	30'-3"	N/A	42'-3"	74'-0"	9'-2 1/2"	28'-3"	N/A	40'-3"	418	2'-8 3/4"	420	2'-2 3/4"	18'-0"	
ET-1366	T-290	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x99	28'-4 1/2"	41'-0"	84'-10 3/4"	79'-6"	9'-9 3/4"	25'-4 1/2"	39'-10 1/4"	81'-10 3/4"	422	4'-0"	425	2'-0"	20'-0"	
ET-1367	T-289	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	29'-6 3/4"	N/A	41'-0 1/2"	75'-0"	9'-4"	27'-6 3/4"	N/A	39'-0 1/2"	422	4'-0"	424	1'-0"	18'-0"	
ET-1369	T-288	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-3"	40'-0"	79'-9 1/2"	75'-0"	9'-4"	28'-3"	40'-0"	79'-9 1/2"	424	3'-11 1/2"	424	4'-11 1/2"	20'-0"	7'-0"
ET-1370	T-286	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	29'-11 3/4'	42'-0"	81'-11 3/4"	75'-0"	9'-4"	27'-11 3/4"	40'-0"	79'-11 3/4"	423	8'-11 3/4"	425	3'-0"	20'-0"	7'-0"
ET-1371	T-285	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-8 1/2"	41'-0"	74'-8 1/2"	75'-0"	9'-4"	27'-8 1/2"	41'-0"	74'-8 1/2"	427	4'-0"	427	3'-0"	20'-0"	
ET-1372	T-284	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-2"	40'-0"	72'-4"	75'-0"	9'-4"	29'-2"	40'-0"	72'-4"	428	3'-0"	428	3'-0"	20'-0"	
ET-1373	T-283	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0"	40'-0"	71'-6"	75'-0"	9'-4"	28'-0"	40'-0"	71'-6"	431	3'-0"	431	3'-0"	18'-0"	
ET-1374	T-282	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0"	40'-0"	70'-6"	73'-0"	9'-1"	27'-0"	40'-0"	70'-6"	434	2'-0"	434	2'-0"	18'-0"	
ET-1375	T-281	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-4 1/2"	40'-0"	69'-11 3/4"	71'-0"	8'-10 1/4"	27'-4 1/2"	40'-0"	69'-11 3/4"	435	2'-0"	435	2'-0"	18'-0"	
ET-1376	T-280	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-10 1/4"	40'-0"	68'-10 1/4"	71'-0"	8'-10 1/4"	25'-10 1/4"	40'-0"	68'-10 1/4"	436	2'-0"	436	1'-6"	18'-0"	
ET-1377	T-279	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-2 1/4"	40'-0"	70'-2 1/4"	71'-0"	8'-10 1/4"	25'-2 1/4"	40'-0"	68'-2 1/4"	434	2'-0"	436	2'-6 3/4"	20-0"	
ET-1378	T-278	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0 1/2"	40'-0"	73'-0 1/2"	71'-0"	8'-10 1/4"	25'-0 1/2"	40'-0"	71'-0 1/2"	433	2'-0"	435	2'-8"	20'-0"	
ET-1380	T-277	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x99	23'-10 3/4"	40'-0"	79'-8 1/4"	79'-6"	9'-9 3/4"	19'-10 3/4"	40'-0"	75'-8 1/4"	433	1'-6 1/4"	437	2'-1 1/2"	20'-0"	7'-0"
ET-1381	T-275	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	29'-3 1/2"	41'-0"	80'-9 1/2"	71'-0"	8'-10 1/4"	29'-3 1/2"	41'-0"	80'-9 1/2"	431	2'-3 1/4"	431	1'-7"	20'-0"	
ET-1382	T-274	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x90	27'-4 1/2"	40'-0"	84'-10 1/2"	71'-0"	8'-10 1/4"	27'-4 1/2"	40'-0"	69'-10 1/2"	431	1'-10 3/4"	431	3'-11"	20'-0"	15'-0"
ET-1383	T-273	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-7 3/4"	40'-0"	86'-7 3/4"	70'-0"	8'-9"	28'-7 3/4"	40'-0"	71'-7 3/4"	429	2'-0"	429	2'-0"	20'-0"	
ET-1385	T-272	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-11 1/4"	40'-0"	88'-5 1/4"	69'-0"	8'-7 1/2"	28'-11 1/4"	40'-0"	73'-5 1/4"	429	2'-0"	429	3'-0"	20'-0"	
et-1385A	T-271	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	29'-7"	40'-0"	88'-7 3/4"	69'-0"	8'-7 1/2"	29'-7"	40'-0"	73'-7 3/4"	428	3'-0"	428	2'-0"	20'-0"	
ET-1386	T-270A	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	27'-5"	40'-0"	83'-10"	79'-0"	9'-9 1/4"	27'-5"	40'-0"	68'-10"	428	3'-0"	428	2'-0"	20'-0"	
ET-1387	T-270	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	28'-7 1/2"	40'-0"	80'-1 1/2"	70'-0"	8'-9"	28'-7 1/2"	40'-0"	65'-1 1/2"	426	3'-0"	426	4'-0"	20'-0"	
ET-1388	T-269	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-9 1/2"	40'-0"	74'-3 1/2"	71'-0"	8'-10 1/4"	27'-9 1/2"	40'-0"	64'-3 1/2"	425	4'-0"	425	4'-0"	20'-0"	
ET-1389	T-268	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-1"	40'-0"	75'-7"	72'-0"	8'-11 3/4"	29'-1"	40'-0"	68'-7"	422	3'-0"	422	4'-9 1/2"	20'-0"	
ET-1390	T-267	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0 1/2"	40'-0"	74'-2 1/2"	72'-0"	8'-11 3/4"	28'-0 1/2"	40'-0"	74'-2 1/2"	422	4'-0"	422	3'-0"	20'-0"	
ET-1391	T-266	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-0 1/4"	41'-0"	73'-0 1/4"	72'-0"	8'-11 3/4"	27'-0 1/4"	41'-0"	73'-0 1/4"	421	2'-0"	421	1'-0"	20'-0"	
ET-1392	T-265	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-10 3/4"	41'-0"	72'-10 1/2"	72'-0"	8'-11 3/4"	24'-10 3/4'	40'-0"	70'-10 1/2"	419	2'-0"	421	2'-10 1/2"	20'-0"	
ET-1393	T-264	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-4 1/4"	41'-0"	74'-4 1/4"	72'-0"	8'-11 3/4"	25'-4 1/4"	40'-0"	71'-4 1/4"	415	2'-0"	418	3'-0 1/4"	20'-0"	
ET-1394	T-263	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	31'-3"	42'-0"	77'-9"	71'-0"	8'-10 1/4"	31'-3"	42'-0"	77'-9"	409	2'-0"	409	4'-8"	20'-0"	
ET-1395	T-262	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-2 1/2"	40'-0"	74'-8 1/2"	72'-0"	8'-11 3/4"	28'-2 1/2"	40'-0"	74'-8 1/2"	410	4'-0"	410	3'-6 1/2"	20'-0"	
ET-1396	T-261	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	28'-0 1/4"	40'-0"	74'-3 1/4"	78'-5 3/4"	9'-8 3/4"	28'-0 1/4"	40'-0"	67'-6 1/4"	408	1'-3 1/2"	408	3'-11 3/4"	20'-0"	
ET-1397	T-260	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	30'-8 1/4"	43'-0"	76'-11 1/4"	71'-9"	8'-11 1/4"	27'-8 1/4"	40'-0"	59'-2 1/4"	403	4'-0"	406	0'-11 1/2"	20'-0"	
ET-1398	T-259	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-6 1/4"	40'-0"	69'-8 1/2"	71'-3"	8'-10 3/4"	27'-6 1/4"	42'-0"	59'-0 1/4"	408	5'-4 1/4"	404	3'-0"	20-0"	
ET-1399	T-258	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-5 1/4"	42'-0"	74'-11 1/4"	71'-0"	8'-10 1/4"	30'-5 1/4"	42'-0"	59'-11 1/4"	401	3'-0"	401	0'-0"	20'-0"	
ET-1400	T-257	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-3 1/2"	42'-0"	70'-9 1/2"	72'-0"	8'-11 3/4"	30'-3 1/2"	42'-0"	62'-9 1/2"	395	4'-10"	395	2'-6 1/2"	18'-0"	
ET-1401	T-256	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	29'-10 3/4"	42'-0"	62'-4 3/4"	72'-0"	8'-11 3/4"	26'-10 3/4"	39'-0"	59'-4 3/4"	393	3'-0"	396	3'-6 1/2"	18'-0"	
ET-1402	T-255	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	27'-7"	39'-0"	59'-7"	77'-0"	9'-6 3/4"	27'-7"	39'-0"	59'-7"	395	3'-9 3/4"	395	7'-2 1/2"	20'-0"	
ET-1403	T-254	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-6"	39'-0"	69'-6"	71'-0"	8'-10 1/4"	27'-6"	39'-0"	59'-6"	395	2'-10 3/4"	395	5'-9 1/2"	20-0"	
ET-1404	T-253	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-8 1/2"	40'-0"	69'-7"	71'-0"	8'-10 1/4"	27'-8 1/2"	40'-0"	59'-7"	395	2'-10 3/4"	395	2'-0"	20-0"	
ET-1405	T-252	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-11"	40'-0"	69'-11"	71'-0"	8'-10 1/4"	27'-11"	40'-0"	59'-11"	395	3'-10 3/4"	395	4'-0"	20-0"	
ET-1406	T-251	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-7"	41'-0"	61'-7"	72'-0"	8'-11 3/4"	29'-7"	41'-0"	61'-7"	394	4'-8 1/2"	394	4'-9 3/4"	20'-0"	

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

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No	Revisions	Date	By

AMTRAK

OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 400
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (3 OF 5)

File No.:	2011-059-S-5117.DWG
Ref. No.:	2011-059
Sheet No:	293 OF 347

S-5117

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

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NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1407	T-250	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-0 1/2"	41'-0"	62'-0 1/2"	73'-0"	9'-1"	30'-0 1/2"	41'-0"	62'-0 1/2"	395	3'-9 1/4"	395	3'-11 13/4"	20'-0"	
ET-1408	T-249	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-1"	42'-0"	62'-3 3/4"	72'-0"	8'-11 3/4"	31'-1"	42'-0"	62'-3 3/4"	396	4'-0"	396	3'-9 3/4"	18'-0"	
ET-1409	T-248	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	31'-7 3/4"	43'-0"	71'-1 3/4"	72'-0"	8'-11 3/4"	28'-7 3/4"	40'-0"	60'-1 3/4"	397	4'-0"	400	3'-9 3/4"	18'-0"	
ET-1410	T-247	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-7"	40'-0"	73'-10 1/2"	72'-0"	8'-11 3/4"	27'-7"	40'-0"	70'-10 1/2"	403	2'-0"	403	3'-9 3/4"	20'-0"	
ET-1413	T-246	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x90	27'-6 3/4"	40'-0"	83'-4 1/2"	72'-0"	8'-11 3/4"	25'-6 3/4"	40'-0"	76'-4 1/2"	405	2'-0"	407	1'-6 1/2"	20'-0"	7'-0"
ET-1414	T-243	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x90	25'-8 1/2"	40'-0"	80'-11 1/2"	72'-0"	8'-11 3/4"	25'-8 1/2"	39'-0"	75'-11 1/2"	409	3'-0"	409	3'-10 1/2"	20'-0"	14'-0"
ET-1416	T-242	W14x145	W14x145	W14x90	(2) L6x6x3/8	W14x90	24'-8 1/2"	40'-0"	81'-8 1/2"	71'-0"	8'-10 1/4"	24'-8 1/2"	40'-0"	76'-8 1/2"	409	2'-5 3/4"	409	3'-3"	20'-0"	14'-0"
ET-1417	T-240	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x99	27'-11 1/2"	42'-0"	90'-11 1/2"	71'-0"	8'-10 1/4"	27'-11 1/2"	42'-0"	75'-11 1/2"	409	3'-6 3/4"	409	2'-1 1/4"	20'-0"	20'-0"
ET-1418	T-239	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x90	29'-3"	41'-0"	86'-9"	71'-0"	8'-10 1/4"	29'-3"	41'-0"	71'-9"	408.57	1'-6 3/4"	408.57	1'-6 3/4"	20'-0"	20'-0"
ET-1419	T-238	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	26'-10"	40'-0"	75'-4"	74'-0"	9'-2 1/2"	26'-10"	40'-0"	69'-4"	413	3'-0"	413	2'-0 3/4"	20'-0"	
ET-1422	T-237	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-10 3/4"	40'-0"	76'-10 3/4"	71'-0"	8'-10 1/4"	27'-10 3/4"	40'-0"	76'-10 3/4"	413	3'-3"	413	3'-4"	20'-0"	
ET-1423	T-234	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-3"	40'-0"	74'-5"	71'-0"	8'-10 1/4"	25'-3"	40'-0"	74'-5"	418	4'-1"	418	3'-7 3/4"	20'-0"	
ET-1425	T-233	W14x132	W14x132	W14x109	(2) L6x6x3/8	W14x90	26'-0"	40'-0"	71'-3 1/2"	71'-0"	8'-10 1/4"	26'-0"	40'-0"	71'-3 1/2"	419	4'-0"	419	2'-6 3/4"	20-0"	20'-0"
ET-1426	T-231	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-5"	40'-0"	70'-11"	71'-0"	8'-10 1/4"	25'-5"	40'-0"	70'-11"	419.5	5'-4 1/2"	419.5	2'-10"	18'-0"	
ET-1427	T-230	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	23'-4"	40'-0"	65'-10"	71'-0"	8'-10 1/4"	23'-4"	40'-0"	65-10"	421	5'-0"	421	4'-11"	18'-0"	14'-0"
ET-1428	T-229	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	23'-8 3/4"	40'-0"	66'-8 3/4"	71'-0"	8'-10 1/4"	23'-8 3/4"	40'-0"	66'-8 3/4"	419	6'-0"	419	4'-7"	18'-0"	
ET-1429	T-228	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	19'-4 1/4"	40'-0"	73'-10 1/4"	71'-0"	8'-10 1/4"	21'-4 1/4"	40'-0"	75'-10 1/4"	418	5'-0"	416	4'-1"	20'-0"	7'-0"
ET-1430	T-227	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	20'-4 1/2"	N/A	31'-4 1/2"	71'-0"	8'-10 1/4"	20'-4 1/2"	N/A	31'-4 1/2"	416	3'-0"	416	3'-0"	18'-0"	
ET-1431	T-226	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	21'-9"	34'-0"	71'-3"	71'-0"	8'-10 1/4"	24'-9"	37'-0"	74'-3"	417	4'-2"	414	5'-0"	20'-0"	7'-0"
ET-1432	T-225	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	22'-6"	40'-0"	65'-6"	71'-0"	8'-10 1/4"	25'-6"	41'-0"	68'-6"	415	4'-0 1/4"	412	2'-6 3/4"	18'-0"	
ET-1433	T-224	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-3"	40'-0"	56'-3"	71'-0"	8'-10 1/4"	27'-3"	40'-0"	58'-3"	410	1'-0"	408	2'-0"	20'-0"	
ET-1434	T-223	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	24'-9"	38'-0"	55'-8 3/4"	71'-0"	8'-10 1/4"	26'-9"	40'-0"	57'-8 3/4"	408	3'-7 1/2"	406	2'-8"	20'-0"	
ET-1435	T-222	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	25'-5"	40'-0"	56'-5"	71'-0"	8'-10 1/4"	25'-5"	40'-0"	56'-5"	405	2'-11 1/4"	405	3'-9 1/4"	18'-0"	
ET-1436	T-221	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-5 1/2"	40'-0"	65'-11 1/2"	72'-0"	8'-11 3/4"	27'-5 1/2"	40'-0"	57'-11 1/2"	401	2'-8 1/2"	401	4'-0"	20'-0"	
ET-1437	T-220	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-6 1/4"	42'-0"	78'-6 1/4"	70'-0"	8'-9"	28'-6 1/4"	40'-0"	61'-6 1/4"	393	3'-2 3/4"	395	2'-0"	20'-0"	
ET-1438	T-219	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-11 1/4"	42'-0"	71'-11 1/4"	72'-0"	8'-11 3/4"	28'-11 1/4"	40'-0"	69'-11 1/4"	390	3'-0"	392	2'-0"	20'-0"	
ET-1439	T-218	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-6 1/4"	40'-0"	59'-6 1/4"	71'-0"	8'-10 1/4"	27'-6 1/4"	40'-0"	74'-6 1/4"	392	6'-0 1/2"	392	2'-9 1/2"	18'-0"	
ET-1440	T-217	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	29'-3 1/2"	40'-0"	59'-9 1/2"	71'-0"	8'-10 1/4"	28'-3 1/2"	40'-0"	73'-9 1/2"	389	3'-0"	390	2'-0"	18'-0"	
ET-1441	T-216	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	27'-6"	40'-0"	60'-0"	71'-0"	8'-10 1/4"	26'-6"	40'-0"	67'-0"	386	4'-9 3/4"	387	3'-0"	20'-0"	
ET-1442	T-215	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	34'-9 3/4"	46'-0"	66'-9 3/4"	80'-0"	9'-10 1/2"	26'-9 3/4"	41'-0"	58'-9 3/4"	378	3'-10 1/2"	386	0'-10 1/4"	20'-0"	
ET-1443	T-214	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-4 1/4"	40'-0"	60'-2 1/2"	71'-0"	8'-10 1/4"	29'-4 1/4"	40'-0"	60'-2 1/2"	382	2'-4"	382	1'-4 3/4"	18'-0"	
ET-1444	T-213	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	31'-2"	42'-0"	63'-2"	71'-0"	8'-10 1/4"	28'-2"	40'-0"	60'-2"	377	3'-7 1/2"	380	3'-4 1/4"	20'-0"	
ET-1445	T-212	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-10 1/4"	40'-0"	60'-10 1/4"	71'-0"	8'-10 1/4"	28'-10 1/4"	40'-0"	60'-10 1/4"	377	4'-11"	377	4'-2 1/4"	18'-0"	
ET-1446	T-211	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-7 3/4"	40'-0"	60'-7 3/4"	71'-0"	8'-10 1/4"	29'-7 3/4"	40'-0"	60'-7 3/4"	375	6'-0 1/4"	375	4'-2"	18'-0"	
ET-1447	T-210	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-8 1/2"	41'-0"	68'-8 1/2"	71'-0"	8'-10 1/4"	28'-8 1/2"	40'-0"	60'-8 1/2"	373	6'-4 1/4"	373	4'-1 3/8"	18'-0"	
ET-1448	T-209	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-10"	42'-0"	77'-10"	72'-0"	8'-11 3/4"	30'-10"	47'-0"	62'-10"	369	4'-8"	369	6'-0"	20'-0"	
ET-1449	T-208	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	33'-10"	45'-0"	79'-10"	69'-0"	8'-7 1/2"	28'-10"	40'-0"	59'-10"	365	6'-7 1/4"	370	3'-11 1/2"	20'-0"	
ET-1450	T-207	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-1 1/4"	42'-0"	74'-1 1/4"	68'-0"	8'-6 1/4"	28'-1 1/4"	42'-0"	59'-1 1/4"	369	3'-7 1/2"	369	4'-0"	18'-0"	
ET-1451	T-206	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-8 3/4"	39'-0"	74'-8 3/4"	68'-0"	8'-6 1/4"	28'-8 3/4"	41'-0"	67'-8 3/4"	366	1'-0"	366	3'-0"	20'-0"	
ET-1461	T-205	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-1"	40'-0"	73'-3"	66'-6"	8'-4"	29'-1"	40'-0"	75'-3"	365	1'-5 1/2"	363	2'-0"	20'-0"	
ET-1462	T-195	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	25'-8"	40'-0"	81'-1 3/4"	71'-0"	8'-10 1/4"	25'-8"	40'-0"	81'-1 3/4"	353	1'-6 1/2"	353	3'-7 1/4"	20'-0"	
ET-1465	T-194	W14x120	W14x120	W14x99	(2) L6x6x3/8	W14x90	31'-3 1/4"	43'-0"	75'-5 1/4"	71'-0"	8'-10 1/4"	31'-3 1/4"	44'-0"	75'-5 1/4"	351	3'-9"	351	3'-6 1/4"	20'-0"	7'-0"
ET-1466	T-191	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	24'-0 1/4"	40'-0"	75'-9 1/4"	71'-0"	8'-10 1/4"	24'-0 1/4"	40'-0"	90'-9 1/4"	348	3'-0"	348	2'-6 3/4"	20'-0"	7'-0"
ET-1467	T-190	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	22'-10 1/2"	40'-0"	64'-6 1/2"	71'-0"	8'-10 1/4"	22'-10 1/2"	40'-0"	79'-6 1/2"	347	4'-9"	347	4'-6 1/4"	20'-0"	
ET-1468	T-189	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	25'-10 1/4"	40'-0"	57'-1 1/4"	68'-0"	8'-6 1/4"	25'-10 1/4"	40'-0"	72'-1 1/4"	342	4'-0"	342	2'-9 1/2"	18'-0"	
ET-1469	T-188	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	29'-6"	40'-0"	61'-0"	68'-0"	8'-6 1/4"	31'-6"	42'-0"	78'-0"	336	3'-1 1/2"	334	3'-1 1/2"	20'-0"	
ET-1470	T-187	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	30'-5 1/2"	41'-0"	60'-11 1/2"	69'-0"	8'-7 1/2"	30'-5 1/2"	42'-0"	75'-11 1/2"	334	3'-5 3/4"	334	1'-11"	20'-0"	
ET-1471	T-186	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	69'-0"	8'-7 1/2"	28'-9"	40'-0"	74'-9"	332.97	2'-10 3/4"	332.97	0'-10 3/4"	20'-0"	
ET-1472	T-185	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	69'-0"	8'-7 1/2"	28'-9"	40'-0"	74'-9"	330.53	2'-6 1/4"	330.53	1'-6 1/4"	20'-0"	
ET-1473	T-184	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-9"	40'-0"	59'-9"	68'-0"	8'-6 1/4"	28'-9"	40'-0"	74'-9"	328.06	2'-11 1/2"	328.06	1'-11 1/2"	20'-0"	
ET-1474	T-183	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-6"	41'-0"	59'-0"	67'-0"	8'-4 3/4"	28'-6"	41'-0"	74'-0"	326	1'-10 3/4"	326	2'-10 3/4"	20'-0"	
ET-1475	T-182	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-7 3/4"	40'-0"	59'-1 3/4"	67'-0"	8'-4 3/4"	28'-7 3/4"	40'-0"	74'-1 3/4"	323	2'-11"	323	1'-11"	20'-0"	
ET-1476	T-181	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	30'-3"	42'-0"	60'-3"	68'-0"	8'-6 1/4"	30'-3"	42'-0"	75'-3"	319	2'-5 1/2"	319	2'-11"	20'-0"	
ET-1477	T-180	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	28'-0"	41'-0"	58'-6"	71'-0"	8'-10 1/4"	27'-0"	41'-0"	65'-6"	318	2'-0"	319	2'-2 3/4"	20'-0"	
ET-1478	T-179	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	28'-7 3/4"	40'-0"	59'-1 3/4"	71'-0"	8'-10 1/4"	28'-7 3/4"	40'-0"	59'-1 3/4"	315	1'-0"	315	2'-0"	20'-0"	
ET-1479	T-178	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	311.72	1'-8 1/2"	311.72	1'-8 3/4"	18'-0"	
ET-1480	T-177	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-2"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	29'-2"	40'-0"	59'-9"	308.57	2'-6 3/4"	308.57	2'-6 3/4"	18'-0"	
ET-1481	T-176	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	28'-9"	40'-0"	59'-9"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	59'-9"	305.6	2'-7 1/4"	305.6	4'-2 3/4"	18'-0"	
ET-1482	T-175	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-9"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	30'-9"	42'-0"	61'-9"	300.6	5'-2 3/4"	300.6	1'-7"	18'-0"	
ET-1483	T-174	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	29'-9"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	29'-9"	42'-0"	61'-9"	297.62	6'-2 3/4"	297.62	4'-10 1/4"	18'-0"	
ET-1484	T-173	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-2 3/4"	42'-0"	61'-8 3/4"	71'-0"	8'-10 1/4"	30'-2 3/4"	42'-0"	61'-8 3/4"	295	7'-0"	295	6'-2 1/2"	18'-0"	
ET-1485	T-172	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	31'-3"	42'-0"	62'-9"	71'-0"	8'-10 1/4"	31'-3"	42'-0"	62'-9"	292	4'-7 1/4"	292	4'-6 1/2"	18'-0"	
ET-1486	T-171	W14x90	W14x90	W14x90	(2) L6x4x3/8	W14x90	30'-3"	42'-0"	61'-9"	71'-0"	8'-10 1/4"	30'-3"	42'-0"	61'-9"	290.76	6'-3 1/2"	290.76	6'-3 3/4"	18'-0"	

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No	Revisions	Date	By

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STRUCTURAL – TYPICAL FRAME & FOUNDATIONS CATENARY FRAME AND FOUNDATION SCHEDULE (4 OF 5)

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5118.DWG
Ref. No.:	2011-059
Sheet No:	294 OF 347

S-5118

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ET-DRAWING NUMBER	CATENARY STRUCTURE ID	MEMBER SIZES					DIMENSIONS								FOUNDATIONS					
		P1 NORTH	P1 SOUTH	P2	SB	CB	a	b	c	d	e	f	g	h	TOF (S)	PIER EXT (S)	TOF (N)	PIER EXT (N)	EMBEDMENT	DOWN GUY ANCHOR EMBEDMENT
ET-1488	T-170	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	30'-9"	42'-0"	71'-9"	71'-0"	8'-10 1/4"	30'-9"	42'-0"	71'-9"	288.71	4'-10 3/4"	288.71	3'-8 1/2"	18'-0"	
ET-1489	T-168	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-8"	40'-0"	69'-11"	71'-0"	8'-10 1/4"	27'-8"	40'-0"	69'-11"	289	5'-2 1/4"	289	4'-0"	20'-0"	
ET-1490	T-167	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-1 1/4"	40'-0"	69'-7 1/4"	71'-0"	8'-10 1/4"	26'-1 1/4"	40'-0"	69'-7 1/4"	288	3'-7 1/4"	288	3'-0"	20'-0"	
ET-1491	T-166	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	22'-7 3/4"	40'-0"	76'-1 3/4"	71'-0"	8'-10 1/4"	22'-7 3/4"	40'-0"	76'-1 3/4"	290	3'-10"	290	3'-1"	20'-0"	7'-0"
ET-1492	T-165	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	20'-7 1/4"	N/A	31'-1 1/4"	71'-0"	8'-10 1/4"	20'-7 1/4"	N/A	31'-1 1/4"	289	1'-8 3/4"	289	1'-0"	18'-0"	
ET-1493	T-164	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	19'-4"	N/A	31'-1"	71'-0"	8'-10 1/4"	19'-4"	N/A	31'-1"	290	1'-8 1/2"	290	1'-7 3/4"	18'-0"	
ET-1494	T-163	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x90	19'-3"	40'-0"	72'-9"	71'-0"	8'-10 1/4"	19'-3"	40'-0"	72'-9"	292	3'-4 3/4"	292	4'-6"	20'-0"	7'-0"
ET-1495	T-162	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-10 1/2"	40'-0"	60'-4 1/2"	71'-0"	8'-10 1/4"	21'-10 1/2"	40'-0"	60'-4 1/2"	287	3'-4 3/4"	287	4'-6"	20'-0"	
ET-1496	T-161	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	19'-5 1/2"	40'-0"	57'-11 1/2"	71'-0"	8'-10 1/4"	19'-5 1/2"	40'-0"	57'-11 1/2"	287	3'-4 3/4"	287	4'-6"	20'-0"	
ET-1497	T-160	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	21'-5 3/4"	40'-0"	59'-11 3/4"	71'-0"	8'-10 1/4"	21'-5 3/4"	40'-0"	59'-11 3/4"	282	3'-4 3/4"	282	4'-4 3/4"	20'-0"	
ET-1499	T-159	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	24'-0 1/4"	40'-0"	62'-6 1/4"	72'-0"	8'-11 3/4"	24'-0 1/4"	40'-0"	62'-6 1/4"	277	2'-11 3/4"	277	3'-7 1/4"	20'-0"	
ET-1500	T-157	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x90	21'-4 1/2"	40'-0"	60'-10 1/2"	72'-0"	8'-11 3/4"	21'-4 1/2"	40'-0"	60'-10 1/2"	276	4'-10"	276	3'-8 1/4"	20'-0"	
ET-1501	T-156	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	19'-6"	40'-0"	67'-0"	72'-0"	8'-11 3/4"	21'-6"	40'-0"	62'-0"	275	4'-3 3/4"	273	3'-0"	20'-0"	
ET-1504	T-155	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x90	20'-7 3/4"	40'-0"	83'-1 3/4"	72'-0"	8'-11 3/4"	20'-7 3/4"	40'-0"	76'-1 3/4"	272	3'-7 1/4"	272	2'-3 1/4"	20'-0"	7'-0"
ET-1505	T-152	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	29'-3 1/4"	40'-0"	94'-3 1/4"	72'-0"	8'-11 3/4"	26'-3 1/4"	40'-0"	76'-3 1/4"	266	2'- 1/2"	269	3'-1 1/4"	20'-0"	7'-0"
ET-1506	T-151	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x90	28'-3"	40'-0"	86'-9"	72'-0"	8'-11 3/4"	28'-3"	40'-0"	71'-9"	262.87	2'-8 1/2"	262.87	1'-8 1/2"	20'-0"	
ET-1507	T-150	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-11 1/4"	40'-0"	71'-5 1/4"	72'-0"	8'-11 3/4"	23'-11 1/4"	40'-0"	64'-5 1/4"	263.5	3'-8 1/4"	263.5	3'-6"	20'-0"	
ET-1508	T-149	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-3"	40'-0"	67'-9"	70'-0"	8'-9"	27'-3"	40'-0"	74'-9"	257.32	2'-3 3/4"	257.32	0'-11 3/4"	20'-0"	
ET-1509	T-148	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-4 1/2"	40'-0"	64'-10 1/2"	72'-0"	8'-11 3/4"	26'-4 1/2"	40'-0"	66'-10 1/2"	257	2'-7 3/4"	255	2'-4 1/2"	20'-0"	
ET-1510	T-147	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	24'-6 3/4"	40'-0"	64'-0 3/4"	71'-0"	8'-10 1/4"	26'-6 3/4"	40'-0"	58'-0 3/4"	254	2'-4 1/2"	252	3'-1 1/2"	20'-0"	
ET-1511	T-146	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-11"	40'-0"	74'-8"	70'-0"	8'-9"	27'-11"	40'-0"	59'-8"	247	0'-9 1/4"	247	1'-1 3/4"	18'-0"	
ET-1512	T-145	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-10 1/4"	40'-0"	74'-10 1/4"	71'-0"	8'-10 1/4"	27'-10 1/4"	40'-0"	59'-10 1/4"	245	0'-10"	245	2'-6 3/4"	18'-0"	
ET-1513	T-144	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x90	27'-8 3/4"	42'-0"	74'-8 3/4"	71'-0"	8'-10 1/4"	27'-8 3/4"	42'-0"	59'-8 3/4"	243	0'-11 3/4"	243	2'-7 1/4"	18'-0"	
ET-1514	T-143	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	27'-9 1/2"	42'-0"	74'-3 1/2"	71'-0"	8'-10 1/4"	27'-9 1/2"	42'-0"	59'-3 1/2"	241	1'-2"	241	3'-2"	20'-0"	
ET-1515	T-142	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	24'-7 1/4"	40'-0"	71'-1 1/4"	71'-0"	8'-10 1/4"	24'-7 1/4"	40'-0"	56'-1 1/4"	242	1'-11 3/4"	242	2'-9 1/2"	20-0"	
ET-1517	T-141	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	23'-10 1/4"	40'-0"	74'-4 1/4"	71'-0"	8'-10 1/4"	26'-10 1/4"	43'-0"	69'-4 1/4"	241	2'-10 1/4"	238	3'-0"	20'-0"	
ET-1518	T-139	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	25'-7 1/2"	40'-0"	78'-1 1/2"	72'-0"	8'-11 3/4"	25'-7 1/2"	40'-0"	68'-1 1/2"	236	1'-10 1/2"	236	6'-0"	20'-0"	
ET-1519	T-138	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	26'-11"	40'-0"	74'-11"	72'-0"	8'-11 3/4"	32'-11"	46'-0"	74'-11"	232	1'-0 3/4"	226	3'-4 1/4"	20'-0"	
ET-1520	T-137	W14x132	W14x132	W14x90	(2) L6x6x3/8	W14x90	26'-9"	40'-0"	77'-3 1/2"	71'-0"	8'-10 1/4"	28'-9"	40'-0"	79'-3 1/2"	227	1'-5 1/2"	225	5'-1 1/4"	20'-0"	
ET-1521	T-136	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x90	24'-11"	N/A	38'-5"	69'-0"	8'-7 1/2"	24'-11"	N/A	38'-5"	224	0'-9 3/4"	224	5'-1"	18'-0"	
ET-1523	T-135	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	24'-7"	40'-0"	80'-4 1/2"	74'-10"	9'-3 3/4"	27'-7"	43'-0"	83'-4 1/2"	223	2'-3"	220	4'-1 3/4"	20'-0"	7'-0"
ET-1524	T-132	W14x159	W14x159	W14x109	(2) L6x6x3/8	W14x99	24'-10 1/2"	40'-0"	80'-4 1/2"	82'-0"	10'-1 1/4"	24'-10 1/2"	40'-0"	80'-4 1/2"	220	1'-0"	220	2'-0"	20'-0"	7'-0"
ET-1525	T-131	W14x132	W14x132	W14x99	(2) L6x6x3/8	W14x99	27'-1 1/2"	40'-0"	71'-7 1/2"	76'-0"	9'-5 1/2"	27'-1 1/2"	40'-0"	71'-7 1/2"	216	2'-2 1/4"	216	1'-0 1/4"	20'-0"	7'-0"
ET-1527	T-130	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	28'-11 1/4"	40'-0"	71'-5 1/4"	73'-0"	9'-1"	28'-11 1/2"	40'-0"	71'-5 1/4"	214	2'-8"	214	0'-9 1/4"	20'-0"	
ET-1528	T-128	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	29'-4 1/2"	42'-0"	65'-10 1/2"	85'-0"	10'-5 1/2"	26'-4 1/2"	40'-0"	62'-10 1/2"	211	2'-2 3/4"	214	2'-9"	20'-0"	
ET-1530	T-127	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x90	29'-9 1/2"	42'-0"	65'-9 1/2"	71'-0"	8'-10 1/4"	29'-9 1/2"	42'-0"	65'-9 1/2"	207.97	0'-7"	207.97	2'-5 3/4"	20'-0"	14'-0"
ET-1531	T-125	W14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	28'-9 1/2"	42'-0"	71'-9 1/2"	76'-0"	9'-5 1/2"	28'-9 1/2"	42'-0"	71'-9 1/2"	204.67	6'-1 1/4"	204.67	2'-8 3/4"	20'-0"	
ET-1533	T-124	w14x120	W14x120	W14x90	(2) L6x6x3/8	W14x99	29'-3 1/2"	42'-0"	65'-9 1/2"	82'-0"	10'-1 1/4"	29'-3 1/2"	42'-0"	65'-9 1/2"	202.75	1'-11"	202.75	4'-6"	20'-0"	14'-0"
ET-1535	T-122A	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x109	28'-9 1/2"	42'-0"	59'-9 1/2"	87'-0"	10'-8 1/4"	28'-9 1/2"	42'-0"	59'-9 1/2"	200.87	0'-9"	200.87	0'-11 1/2"	20'-0"	
ET-1536	T-121A	W14x99	W14x99	W14x90	(2) L6x4x3/8	W14x99	28'-9"	42'-0"	59'-3"	84'-0"	10'-4"	28'-9"	42'-0"	59'-3"	199	0'-11 1/2"	199	3'-1 3/4"	20'-0"	
ET-1537	T-120A	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	28'-9 1/2"	42'-0"	64'-9 1/2"	79'-0"	9'-9 1/4"	28'-9 1/2"	42'-0"	64'-9 1/2"	196.44	1'-5 1/4"	196.44	4'-11"	20'-0"	
ET-1539	T-118A	W14x109	W14x109	W14x90	(2) L6x4x3/8	W14x99	27'-10 1/4"	39'-0"	63'-10 1/4"	76'-0"	9'-5 1/2"	27'-10 1/4"	39'-0"	63'-10 1/4"	195	1'-5 1/2"	195	4'-10"	20'-0"	
ET-1540	T-116A	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	27'-2 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	27'-2 1/2"	40'-0"	84'-3"	190	1'-0"	190	2'-6 3/4"	20'-0"	7'-0"
ET-1542	T-115A	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	27'-9 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	27'-9 1/2"	40'-0"	84'-10"	187	1'-9 1/2"	187	0'-6 1/4"	20'-0"	
ET-1543	T-113A	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x99	27'-2 3/4"	40'-0"	40'-0"	76'-0"	9'-5 1/2"	27'-2 3/4"	40'-0"	85'-6 1/4"	186	1'-10 1/4"	186	1'-5 1/2"	20'-0"	
ET-1544	T-112A	W14x145	W14x145	W14x120	(2) L6x6x3/8	W14x109	26'-0 1/2"	40'-0"	40'-0"	75'-0"	9'-4"	26'-0 1/2"	40'-0"	94'-4"	185	1'-7 3/4"	185	4'-11"	20'-0"	7'-0"
ET-1545	T-111	W14x90	W14x90	N/A	(2) L6x4x3/8	W14x99	25'-4 1/2"	37'-0"	37'-0"	76'-0"	9'-5 1/2"	25'-4 1/2"	37'-0"	37'-0"	184	3'-8 1/4"	184	0'-0"	20'-0"	
ET-1546	T-110	W14x145	W14x145	W14x120	(2) L6x6x3/8	W14x109	27'-3 1/4"	40'-0"	40'-0"	77'-0"	9'-6 3/4"	27'-3 1/4"	40'-0"	95'-6 3/4"	181	1'-6 3/4"	181	1'-0"	20'-0"	7'-0"
ET-1547	T-109	W14x145	W14x145	W14x109	(2) L6x6x3/8	W14x109	28'-6"	40'-0"	40'-0"	77'-0"	9'-6 3/4"	28'-6"	40'-0"	92'-9 1/2"	176.6	2'-0"	176.6	1'-7 3/4"	20'-0"	
ET-1548	T-108	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	20'-1"	31'-4 1/2"	31'-4 1/2"	74'-0"	9'-2 1/2"	25'-0 3/4"	40'-0"	86'-4 3/4"	182	5'-1"	177	2'-0"	20'-0"	
ET-1549	T-107	W14x145	W14x145	W14x99	(2) L6x6x3/8	W14x90	28'-1 3/4"	40'-0"	40'-0"	74'-0"	9'-2 1/2"	28'-1 3/4"	40'-0"	89'-5 1/4"	171	1'-0"	171	0'-10 1/4"	20'-0"	
	T-106	W14x159	W14x159	W14x99	(2) L6x6x3/8	W14x99	27'-11 3/4"	41'-0"	41'-0"	77'-0"	9'-6 3/4"	27'-11 3/4"	41'-0"	90'-4 1/2"	167	3'-0"	167	1'-4"	20'-0"	

NOTES:
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. SEE DWG S-5103 FOR TYPICAL CATENARY FRAME.

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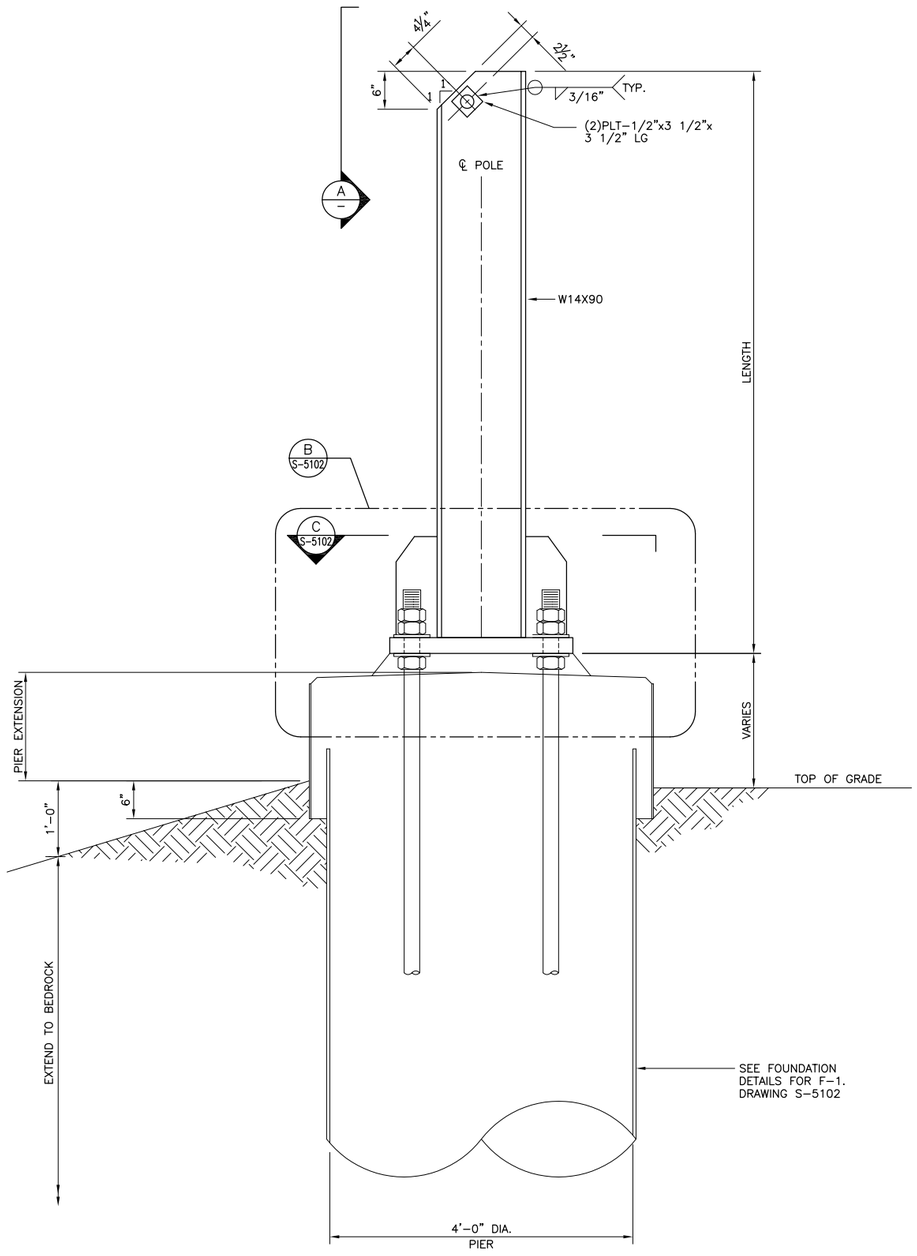
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
CATENARY FRAME AND FOUNDATION SCHEDULE (5 OF 5)

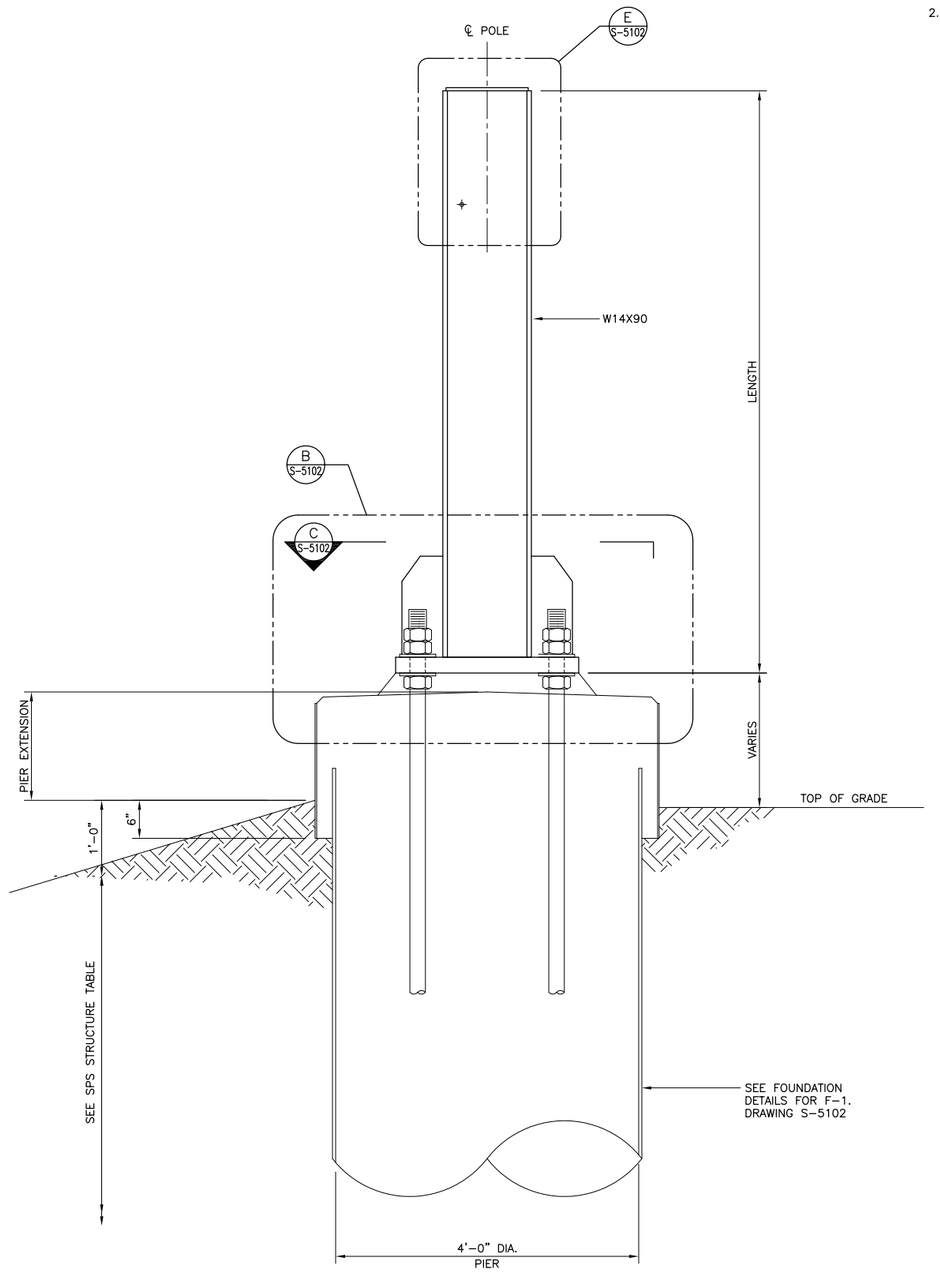
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File No.:	2011-059-S-5119.DWG
Ref. No.:	2011–059
Sheet No:	295 OF 347

S–5119



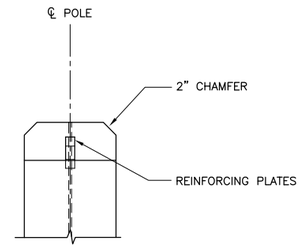
DOWNGUY STUB POLE DETAIL (DGP)
SCALE: 1" = 1'-0"



SPS POLE DETAIL
SCALE: 1" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



A SECTION
SCALE: 1"=1'-0"

DOWNGUY STUB POLE SCHEDULE			
STRUCTURE	NORTH OR SOUTH	LENGTH	TOF
T-274	NORTH	10'	430.00
T-274	SOUTH	10'	430.00

SPS STRUCTURES			
STRUCTURE	POLE LENGTH	PIER EMBEMDENT	REMARKS
SPS-1	40'-0"	15'-0"	
SPS-2	40'-0"	15'-0"	
SPS-3	40'-0"	15'-0'	

1' 0 1' 2'
SCALE: 1"=1'-0"

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL FRAME & FOUNDATIONS
DOWNGUY STUB POLE DETAIL (DGP)

Recommended: DP	Drawn: SZM	Checked: MJM	Date: 03/17/16

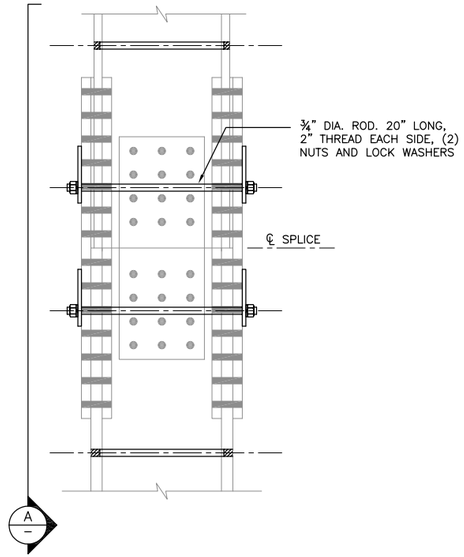
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Ref. No.:	2011-059
Sheet No:	296 OF 347

S-5123

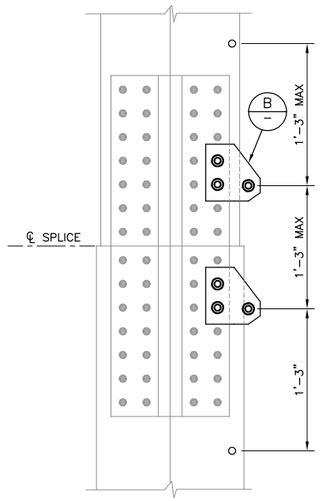
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NOTES:

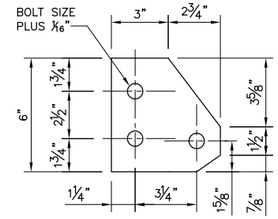
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.



POLE STEP DETAIL
SCALE: 1 1/2" = 1'-0"

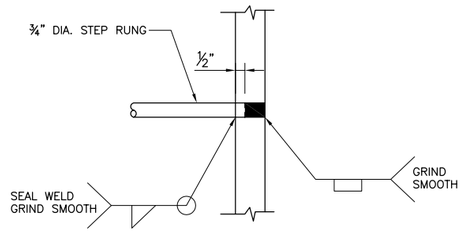


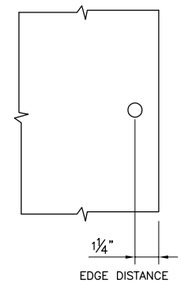
A ELEVATION
SCALE: 1 1/2"=1'-0"



⅜" THICK PLATE

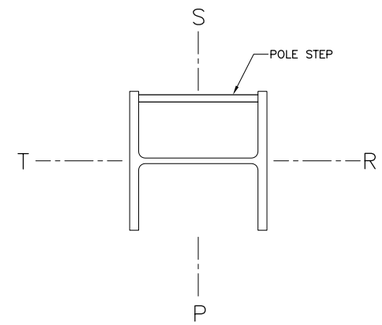
B PLATE FOR POLE STEP AT SPLICE
SCALE: 3"=1'-0"





NOTE:
PROVIDE ¾" DIA. STEP RUNG AT 1'-3" MAX. SPACING ON "S" SIDE OF POLE. STEPS SHALL START 20' ABOVE GRADE. POLES STEPS TO BE OMITTED FROM TOP 3' OF POLE. STEP RUNGS APPLY FOR POLES WITH W14x159 OR HEAVIER AS A BASE COLUMN.

C POLE STEP
SCALE: 3"=1'-0"



POLE ORIENTATION
SCALE: 1 1/2" = 1'-0"

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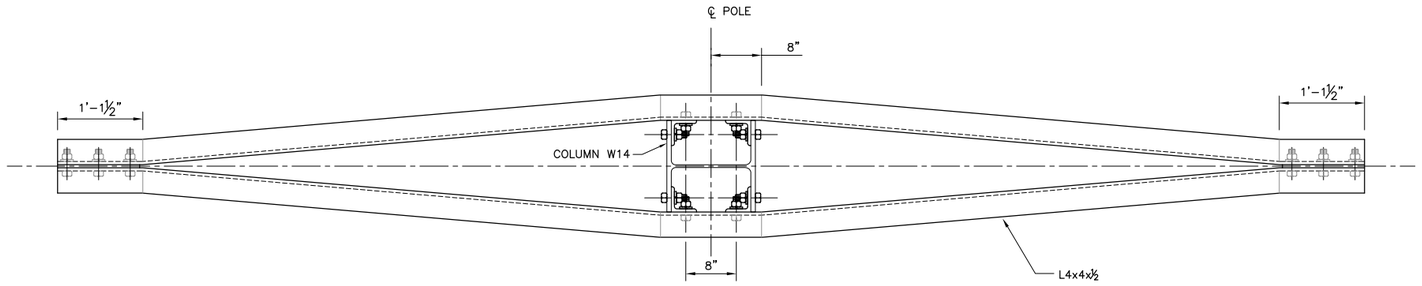
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL FRAME & FOUNDATIONS
POLE STEP DETAILS (PSD1)

Recommended: DP	Drawn: SZM	Checked: MJM	Date: 03/17/16

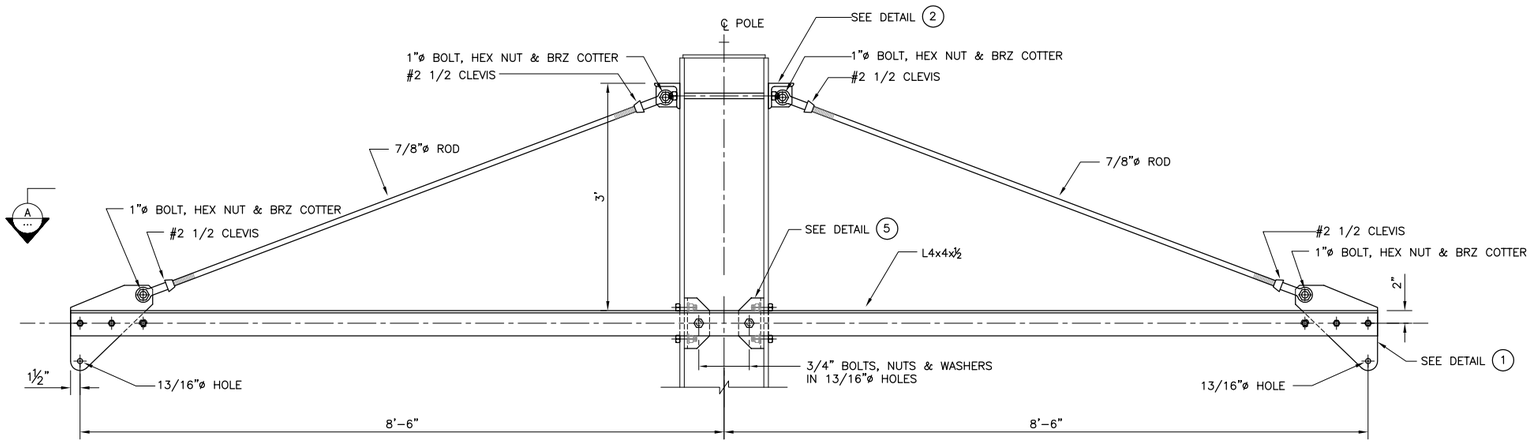
File No.:	2011-059-S-5124.DWG
Ref. No.:	2011-059
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S-5124

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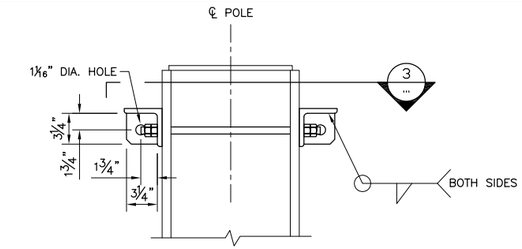
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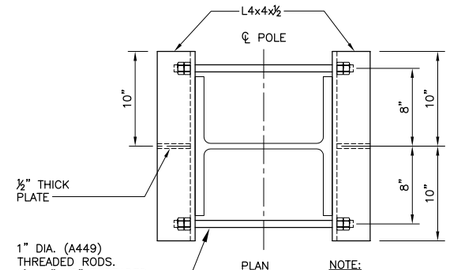
TRANSMISSION ARM BRACKET (BA1)

1' 0 1' 2'

SCALE: 1"=1'-0"

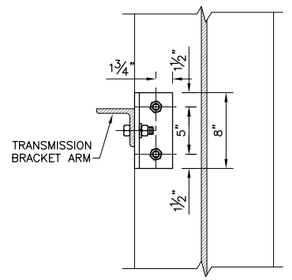


2 DETAIL
SCALE: 1 1/2"=1'-0"

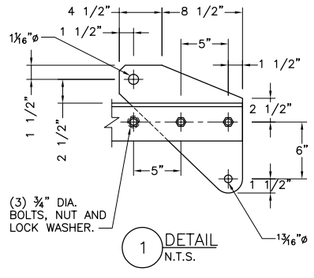


NOTE:
THIS CONFIGURATION FITS COLUMN SIZES W14X90, W14X99, W14X109, AND W14X120

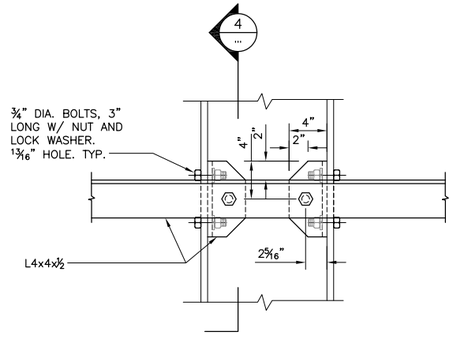
3 DETAIL
SCALE: 1 1/2"=1'-0"



4 DETAIL
SCALE: 1 1/2"=1'-0"



1 DETAIL
N.T.S.



5 DETAIL
SCALE: 1 1/2"=1'-0"

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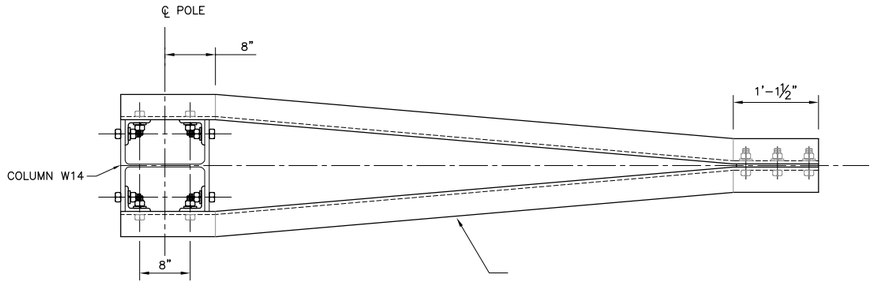
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA1)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

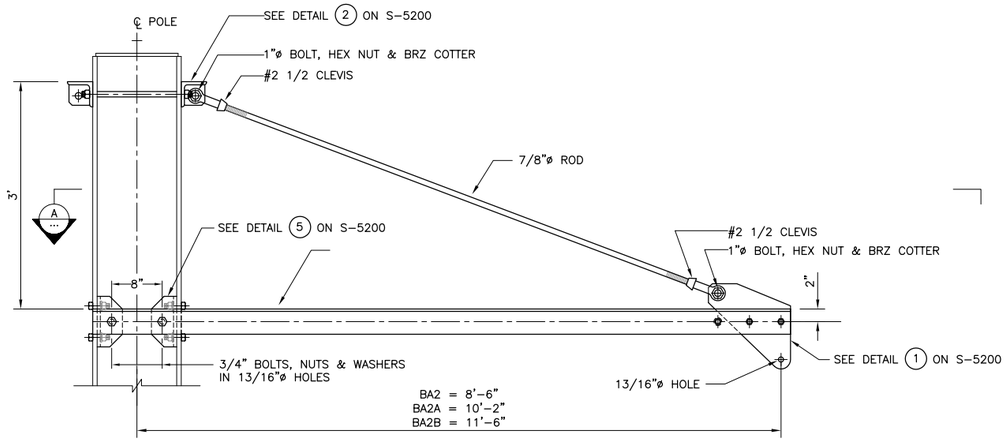
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Ref. No.:	2011-059
Sheet No:	298 OF 347

S-5200

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A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA2, BA2A & BA2B)

1' 0 1' 2'

SCALE: 1"=1'-0"

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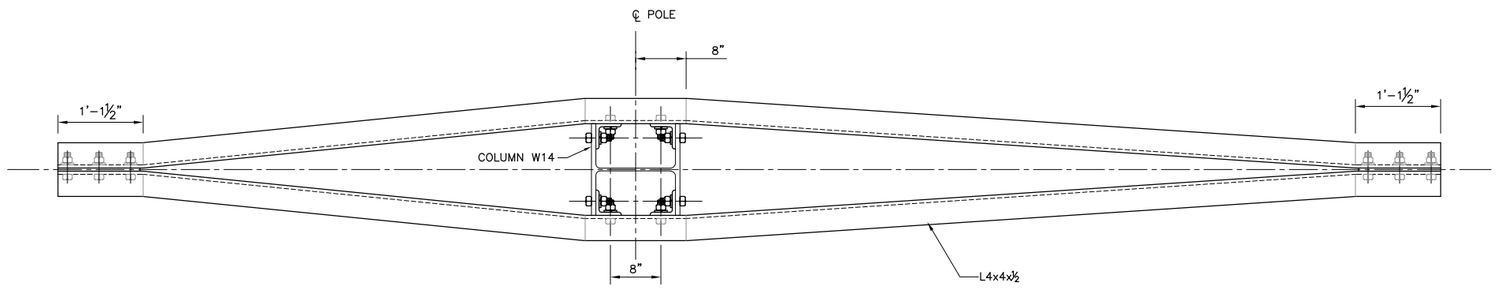
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA2, BA2A & BA2B)

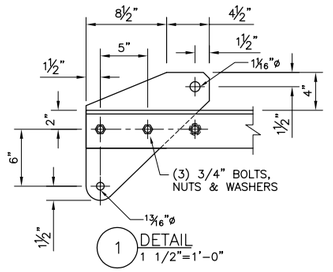
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Sheet No:	299 OF 347

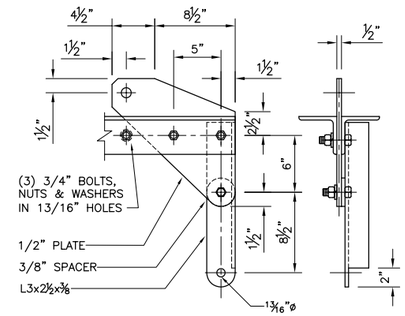
S-5201



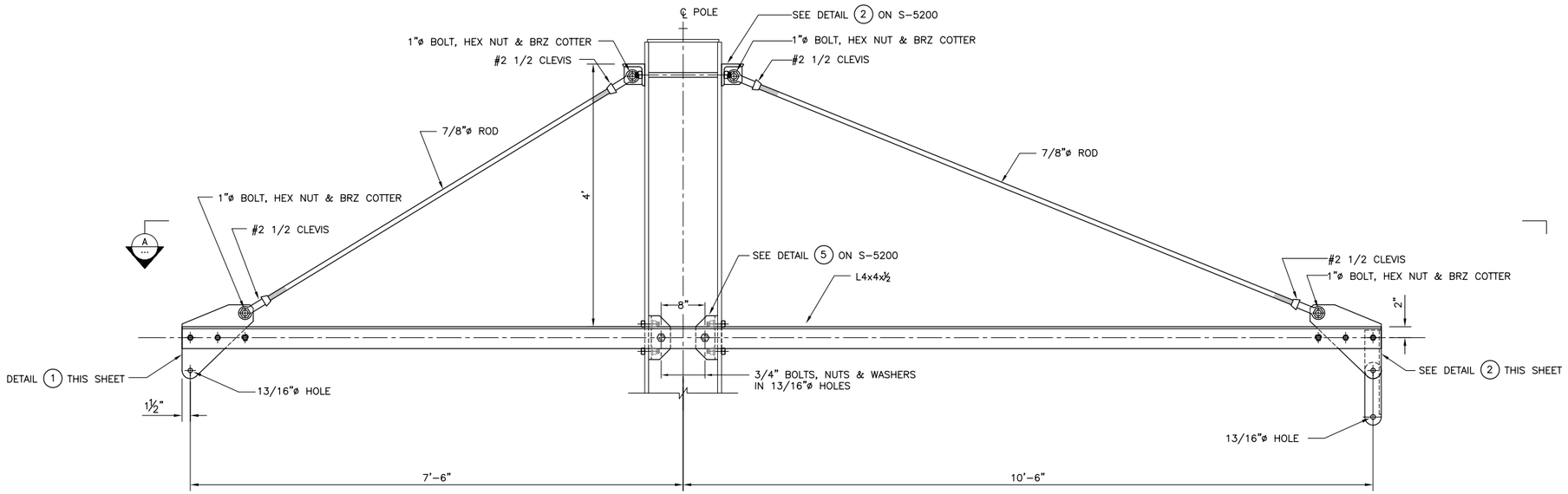
A SECTION
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1 DETAIL
1 1/2"=1'-0"



2 DETAIL
1 1/2"=1'-0"



TRANSMISSION ARM BRACKET (BA3)

1' 0 1' 2'

SCALE: 1"=1'-0"

3/14/2016 4:17:06 PM J:\2011\2011-059\Drawings\working drawings.zoo to bryn mawr\heavy structural\2011-059-S-5202.dwg

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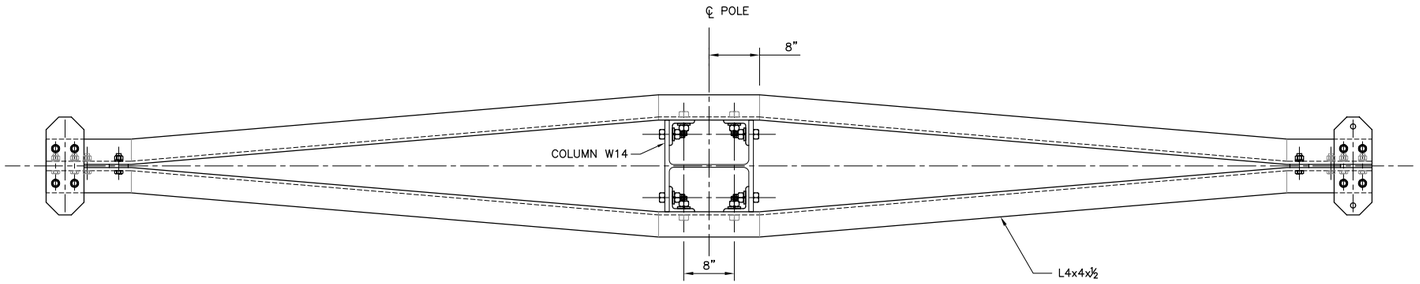
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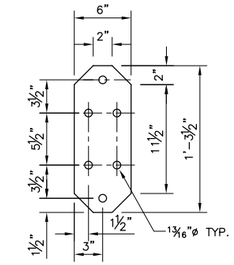
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Sheet No:	300 OF 347

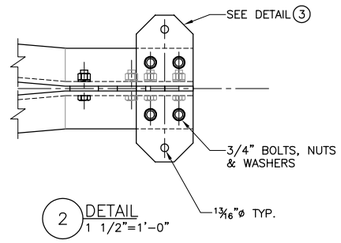
S-5202



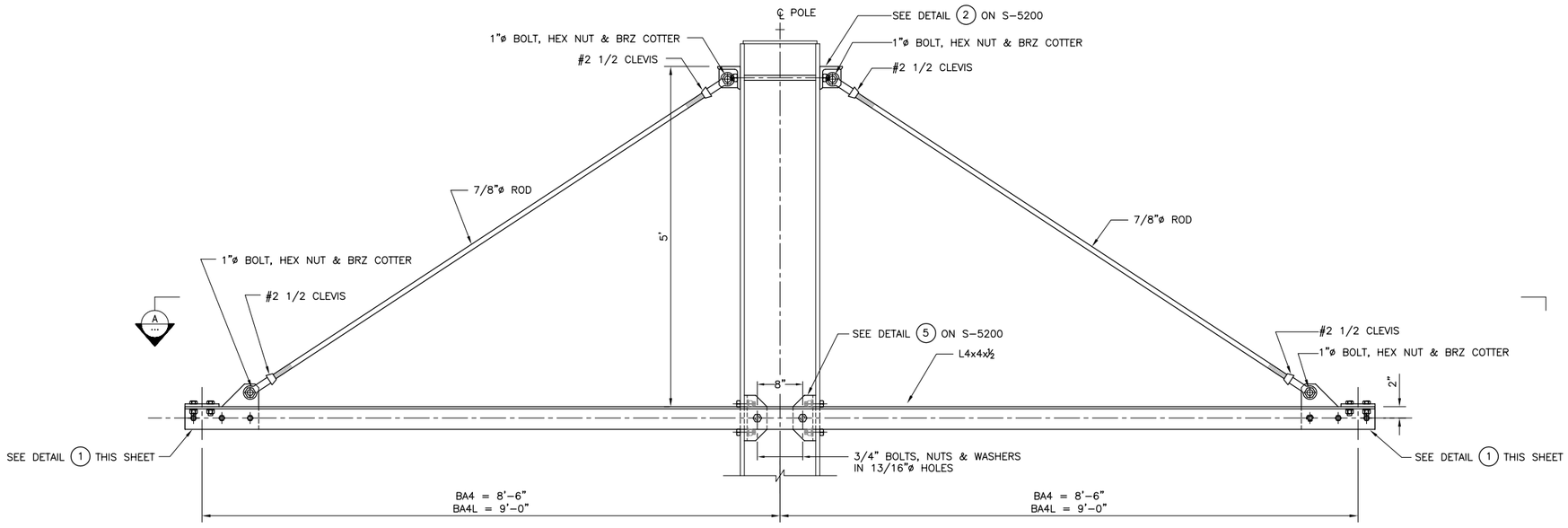
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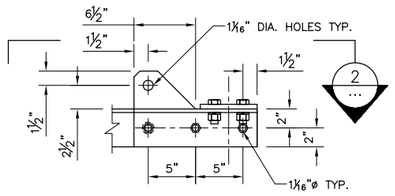


3 DETAIL
1 1/2"=1'-0"



2 DETAIL
1 1/2"=1'-0"





1 DETAIL
1 1/2"=1'-0"

TRANSMISSION ARM BRACKET (BA4 & BA4L)

1' 0 1' 2'

SCALE: 1"=1'-0"

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Engineering
National Railroad Passenger Corporation
30TH Street Station—Philadelphia, Pennsylvania 19104

Approved	Date

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TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103
IN ASSOCIATION WITH
Baker
AECOM

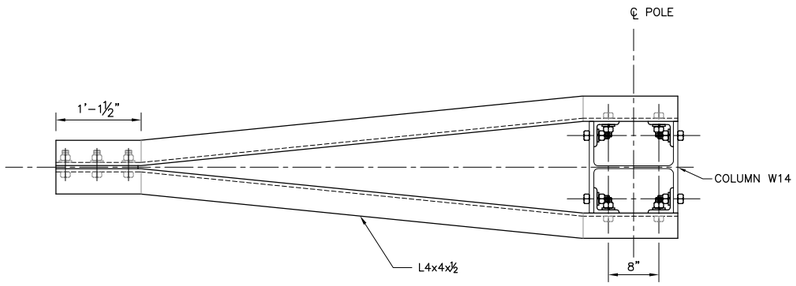
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA4 & BA4L)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

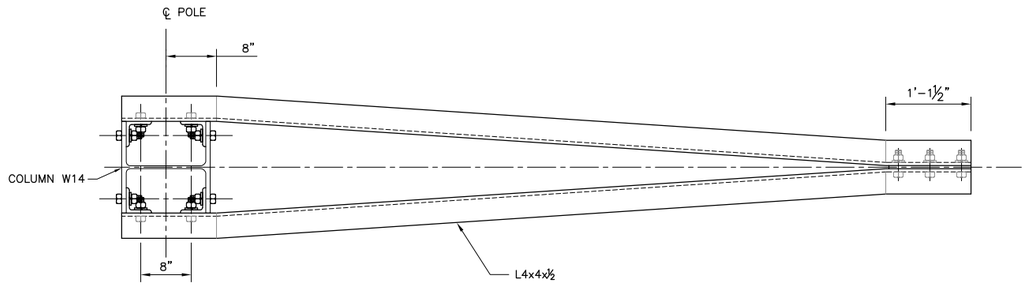
File No.:	2011-059-S-5203.DWG
Ref. No.:	2011-059
Sheet No:	301 OF 347

S-5203

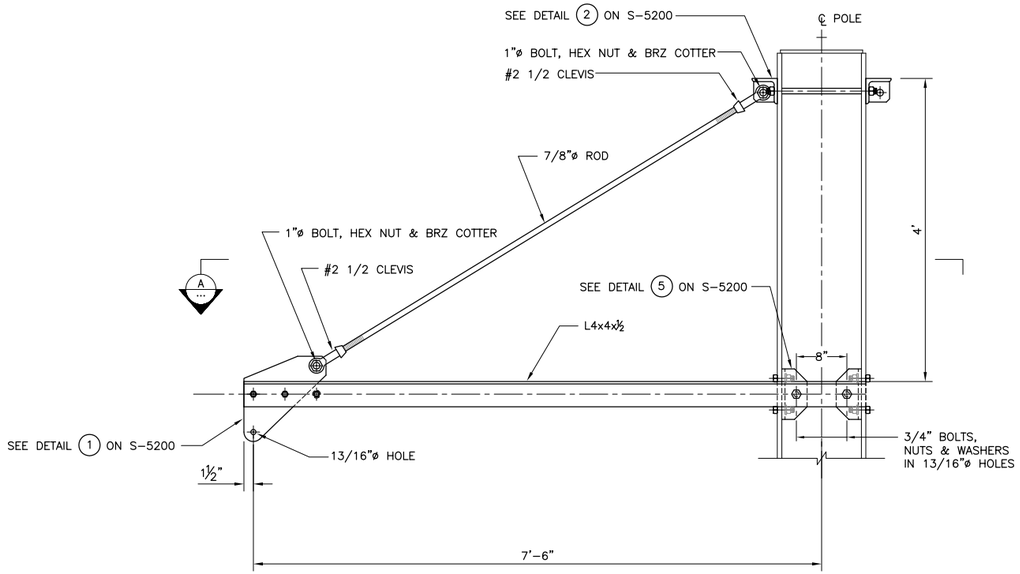
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A SECTION
SCALE: 1"=1'-0"



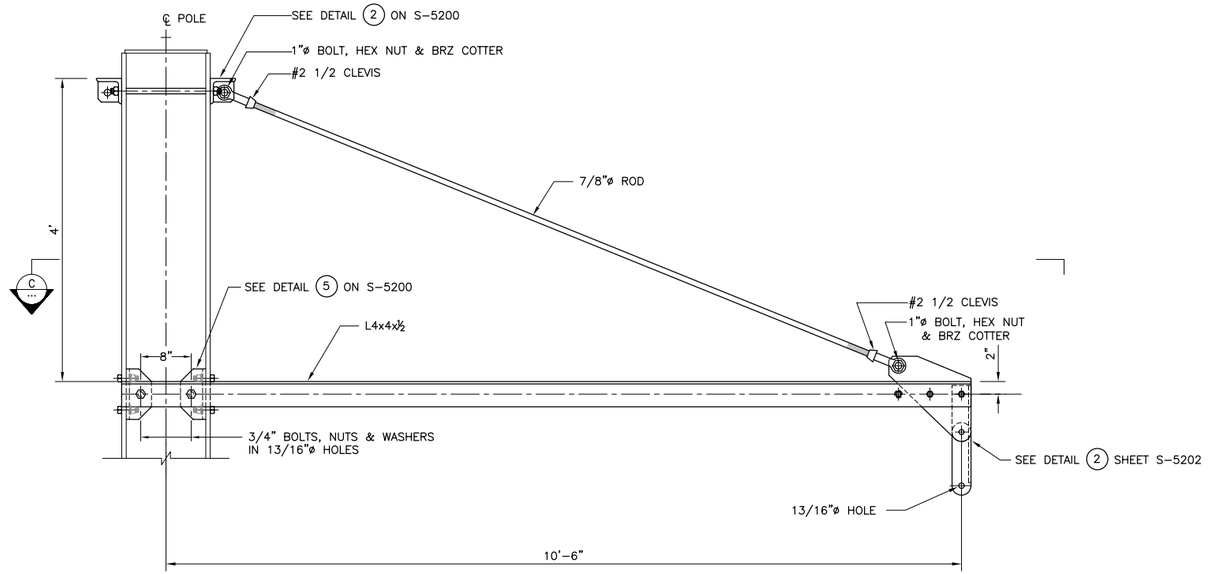
C SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA5)

1' 0 1' 2'

SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA6)

1' 0 1' 2'

SCALE: 1"=1'-0"

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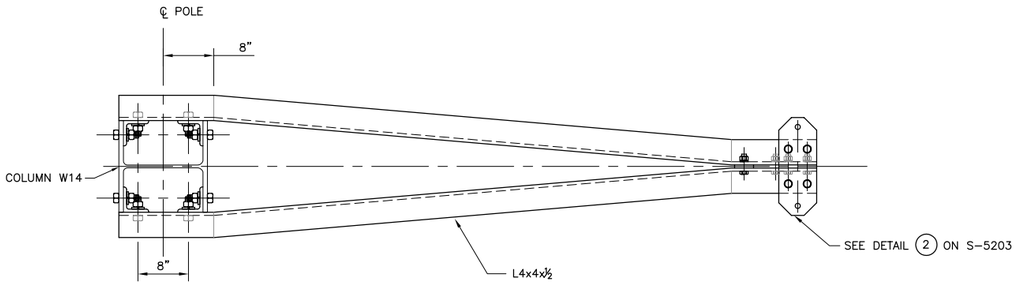
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA5&6)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

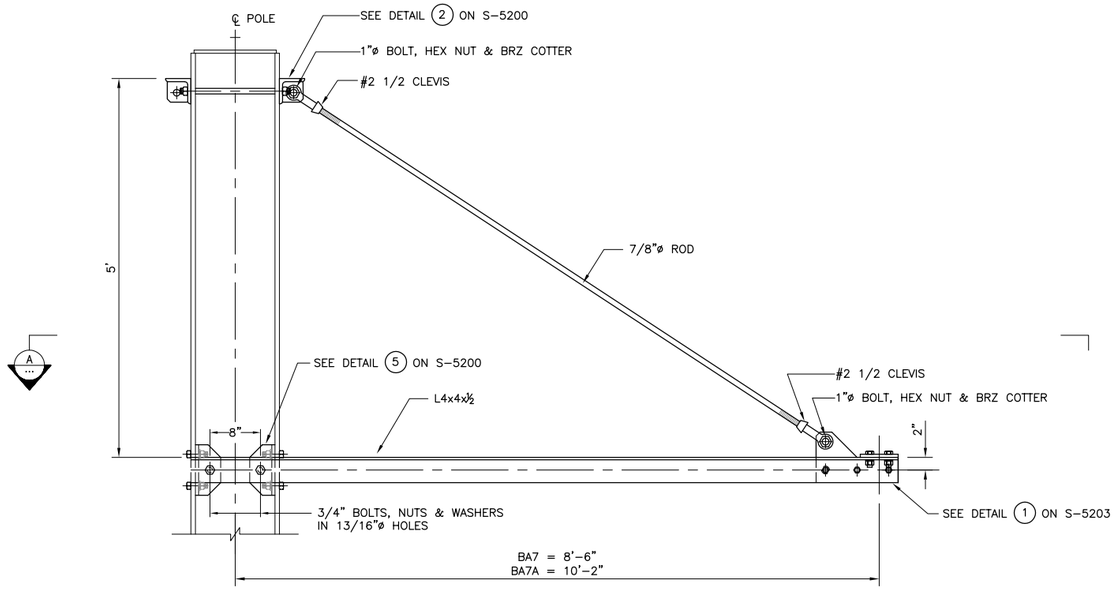
File No.:	2011-059-S-5204.DWG
Ref. No.:	2011–059
Sheet No:	302 OF 347

S–5204

4:17:16 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5204.dwg



A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA7 & BA7A)

1' 0 1' 2'

SCALE: 1"=1'-0"

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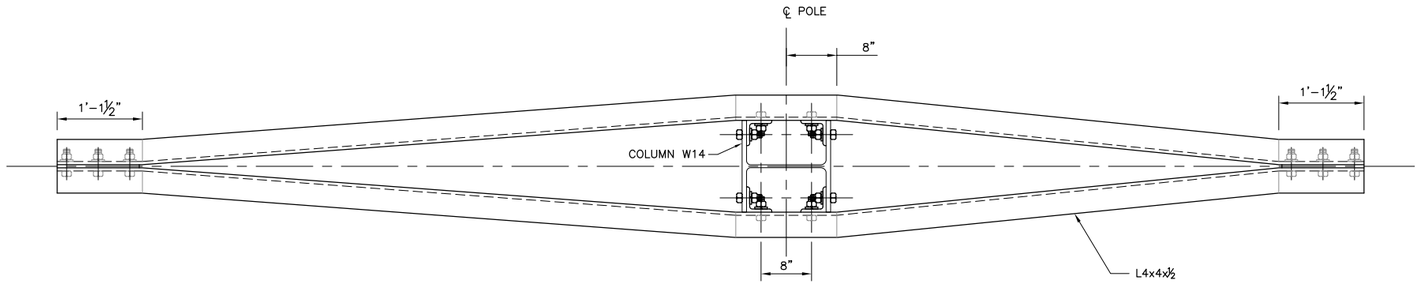
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA7 & BA7A)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

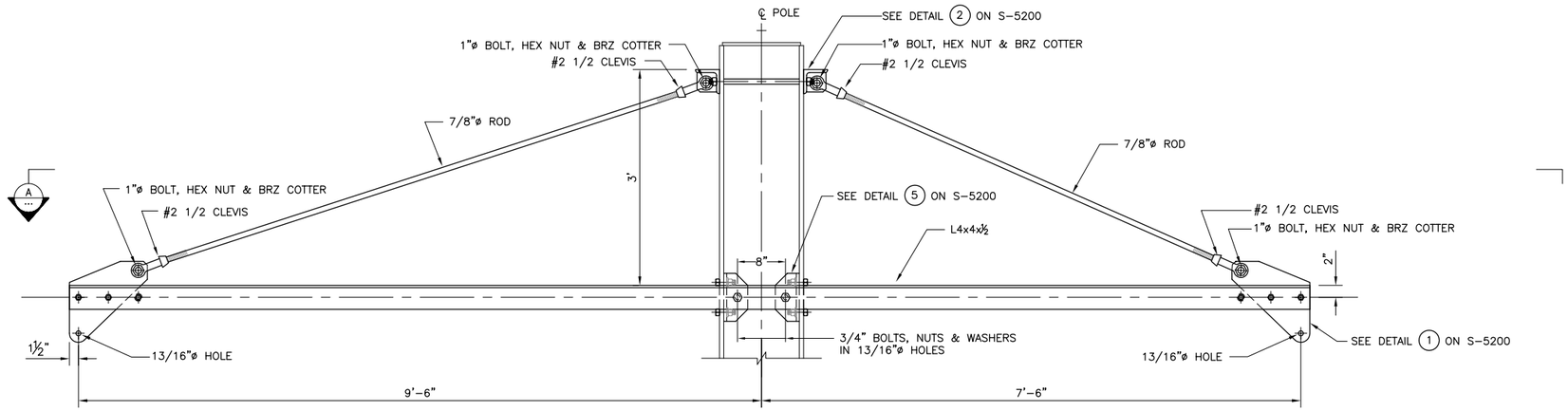
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Ref. No.:	2011-059
Sheet No:	303 OF 347

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3/14/2016 4:17:20 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5205.dwg



A SECTION
SCALE: 1"=1'-0"



TRANSMISSION ARM BRACKET (BA8)

1' 0 1' 2'

SCALE: 1"=1'-0"

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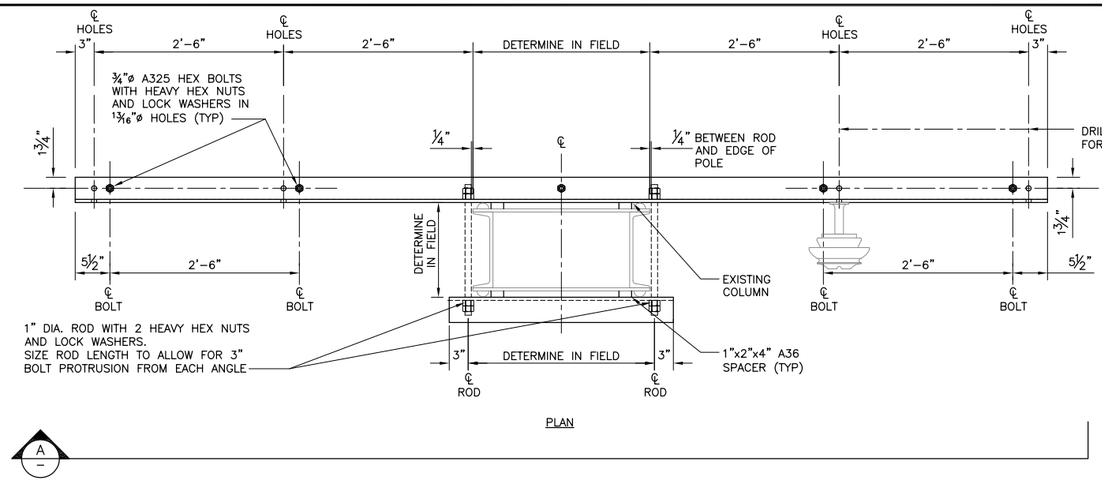
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL
TYPICAL TRANSMISSION BRACKETS (BA8)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5206.DWG
Ref. No.:	2011-059
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3/14/2016 4:17:25 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5206.dwg

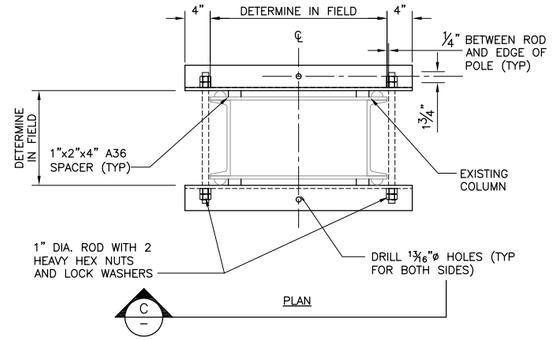


PLAN

A

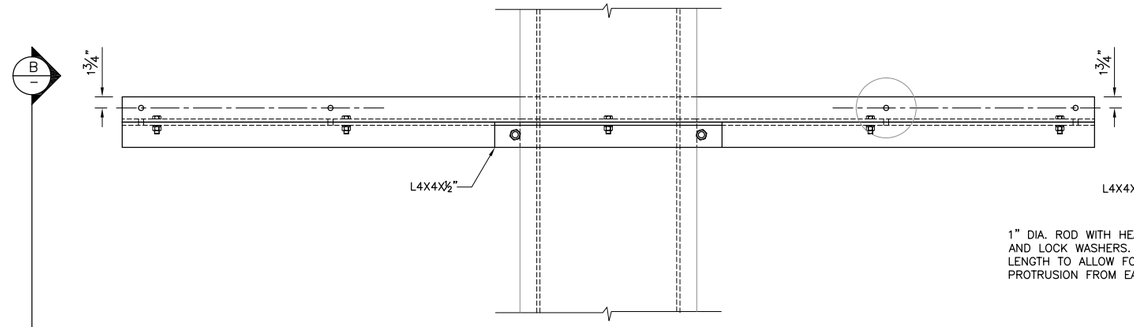
NOTES:

1. CONTRACTOR SHALL FIELD VERIFY COLUMN DIMENSIONS AND SIZE BRACKET ACCORDINGLY.



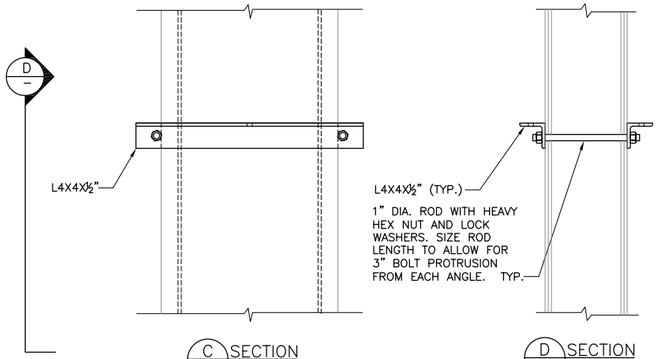
PLAN

C



A SECTION
SCALE: 1"=1'–0"

B SECTION
SCALE: 1"=1'–0"

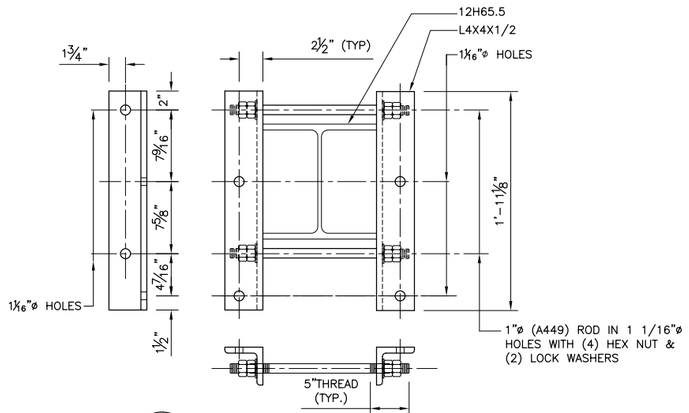


C SECTION
SCALE: 1"=1'–0"

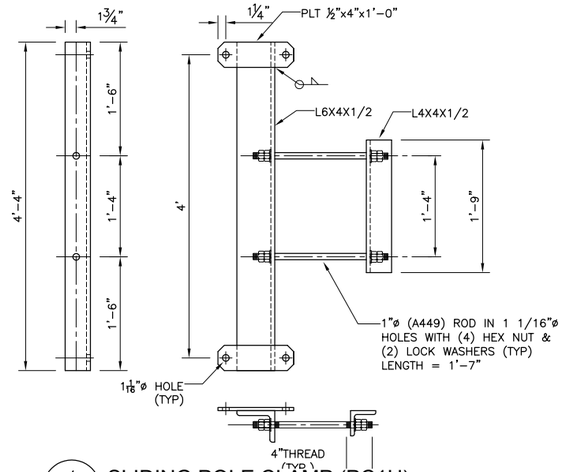
D SECTION
SCALE: 1"=1'–0"

1 S-5211 SIGNAL POWER BRACKET (SPB1)
SCALE: 1"=1'–0"

3 S-5211 SLIDING POLE CLAMP (PC1G)
SCALE: 1"=1'–0"



2 S-5211 SLIDING POLE CLAMP (PC1D)
SCALE: 1"=1'–0"



4 S-5211 SLIDING POLE CLAMP (PC1H)
SCALE: 1"=1'–0"

1' 0 1' 2'
SCALE: 1"=1'–0"

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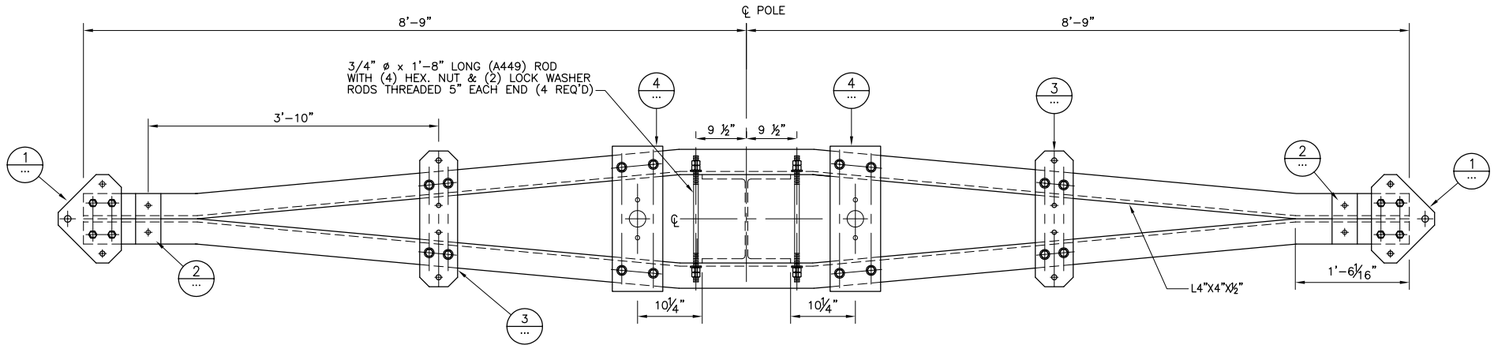
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
MISCELLANEOUS SIGNAL POWER BRACKETS

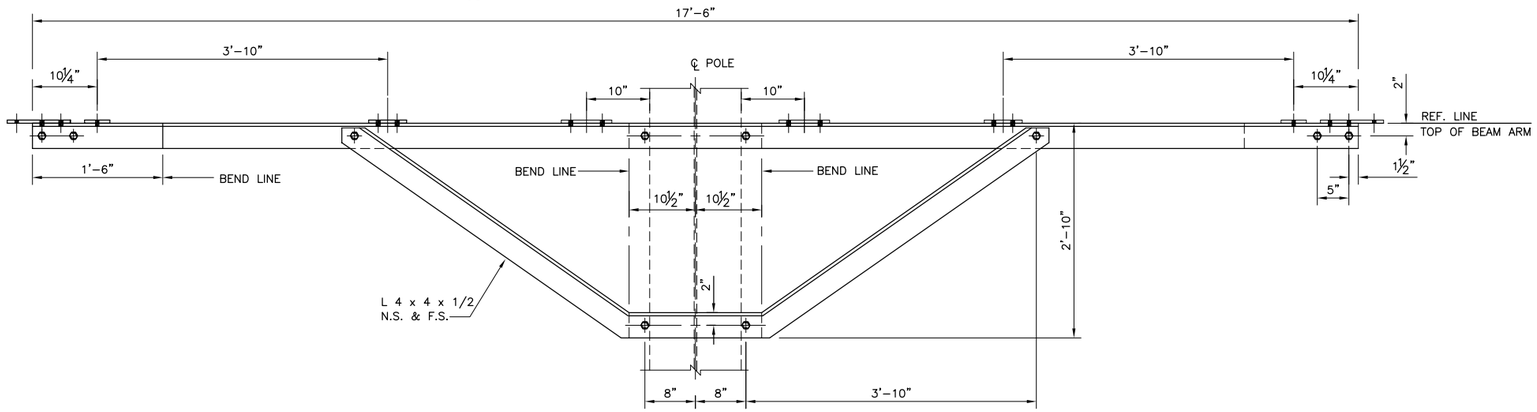
Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5211.DWG
Ref. No.:	2011-059
Sheet No:	305 OF 347

S-5211

3/14/2016 4:17:30 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5211.dwg



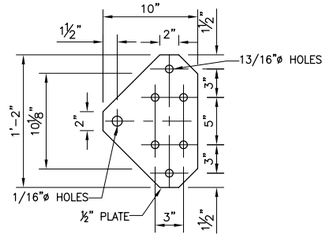


ALL BOLT HOLES 13⁄16" DIA. U.O.N.
ALL BOLTS ¾" DIA. U.O.N

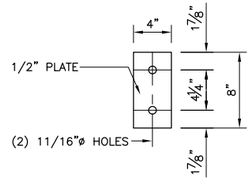
A / S-5212 CROSS TRACK FEEDER BRACKET (CA-1)

1' 0 1' 2'

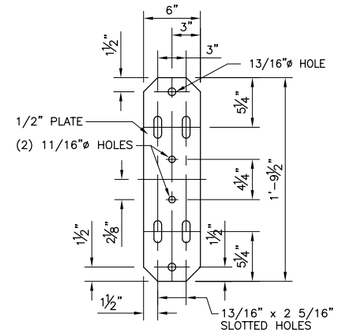
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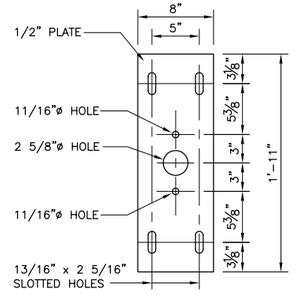
1 FEEDER SUPPORT PLATE
N.T.S.



2 FRONT SUPPORT PLATE
N.T.S.



3 REAR SUPPORT PLATE
N.T.S.



4 BEARING PLATE
N.T.S.

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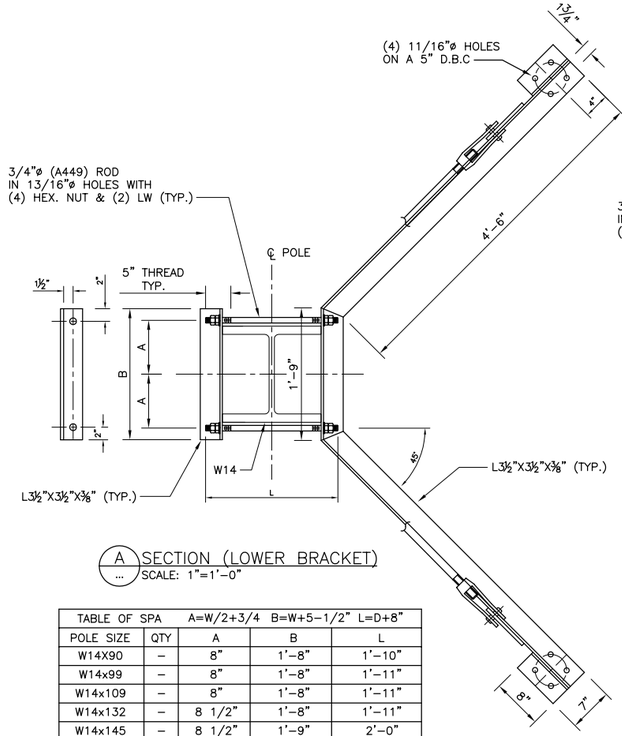
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
CROSS TRACK FEEDER ARM (CA–1)

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5212.DWG
Ref. No.:	2011–059
Sheet No:	306 OF 347

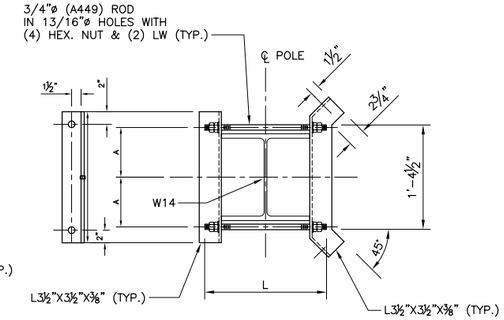
S–5212

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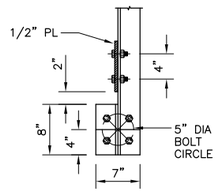


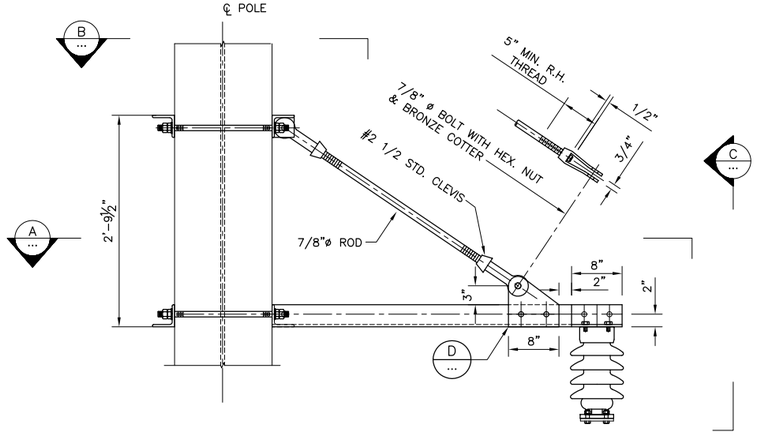
A SECTION (LOWER BRACKET)
SCALE: 1"=1'-0"

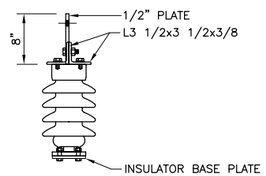
TABLE OF SPA		A=W/2+3/4	B=W+5-1/2"	L=D+8"
POLE SIZE	QTY	A	B	L
W14X90	–	8"	1'-8"	1'-10"
W14x99	–	8"	1'-8"	1'-11"
W14x109	–	8"	1'-8"	1'-11"
W14x132	–	8 1/2"	1'-8"	1'-11"
W14x145	–	8 1/2"	1'-9"	2'-0"
W14x159	–	8 1/2"	1'-9"	2'-0"



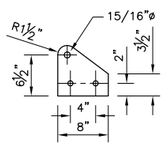
B SECTION (UPPER BRACKET)
SCALE: 1"=1'-0"







C SECTION
SCALE: 1"=1'-0"



D 1/2' PLATE
N.T.S.

1 S-5213 SPIDER ARM BRACKET (SPA)

1' 0 1' 2'

SCALE: 1"=1'-0"

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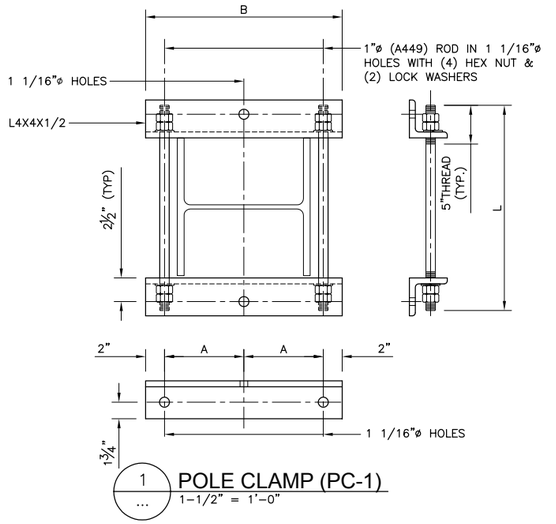
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SPIDER ARM BRACKET (SPA-1)

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5213.DWG
Ref. No.:	2011-059
Sheet No:	307 OF 347

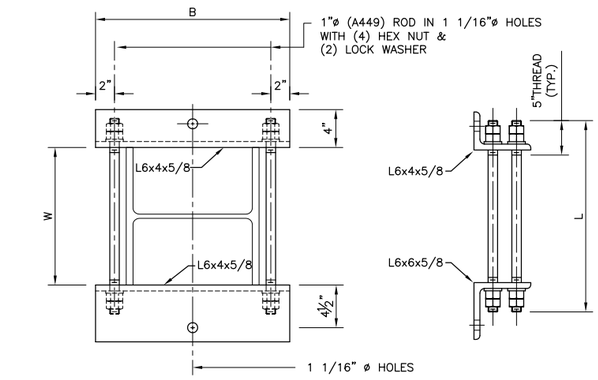
S-5213

4:17:39 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5213.dwg



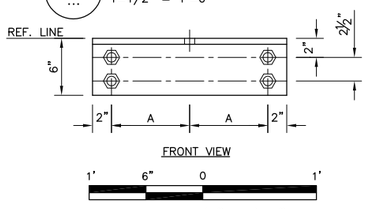
1 POLE CLAMP (PC-1)
1–1/2" = 1'–0"

TABLE OF DIMENSIONS FOR PC1 AND PC2			
POLE SIZE	A	B	L
W14X90	8"	1'–8"	1'–11"
W14x99	8"	1'–8"	1'–11"
W14x109	8"	1'–8"	1'–11"
W14x132	8"	1'–8"	1'–11"
W14x145	8 1/2"	1'–9"	2'–0"
W14x159	8 1/2"	1'–9"	2'–0"



TOP VIEW

SIDE VIEW

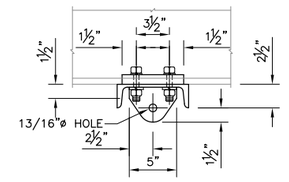


FRONT VIEW

2 POLE CLAMP (PC-2)
1–1/2" = 1'–0"

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"



B SECTION
N.T.S.

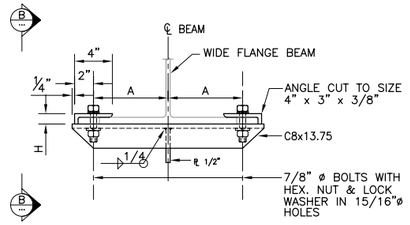


TABLE OF CSC1 A=W/2+5/8 H=T+3/8				
BEAM SIZE	FLG WIDTH W	FLG THK	A	H
W14X90	14.52"	0.710	7 7/8"	1 1/8"

3 SLIDING BRACKET (CSC1)
1–1/2" = 1'–0"

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

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National Railroad Passenger Corporation
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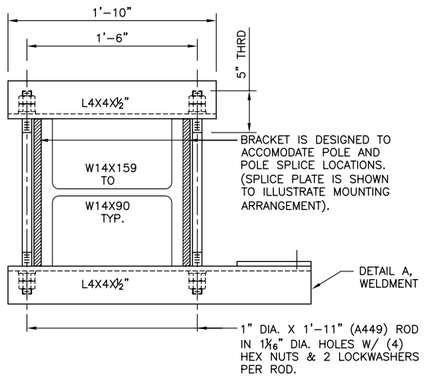
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SLIDING BRACKET DETAILS

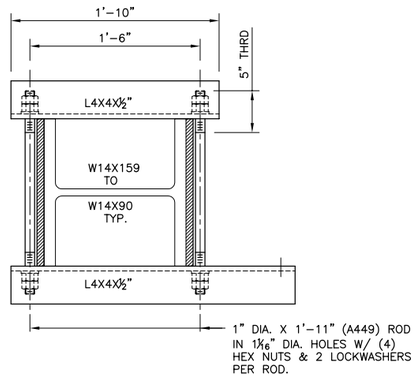
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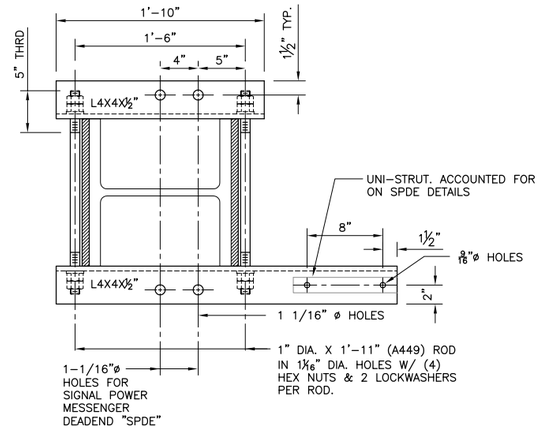
File No.:	2011-059-S-5214.DWG
Ref. No.:	2011–059
Sheet No:	308 OF 347

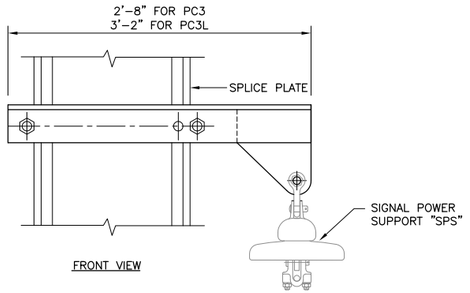
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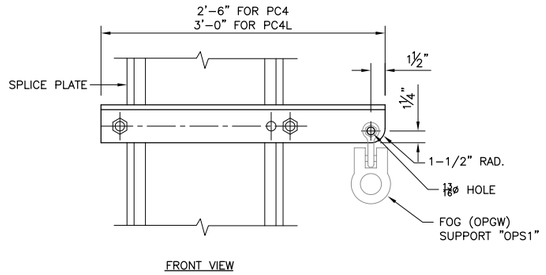
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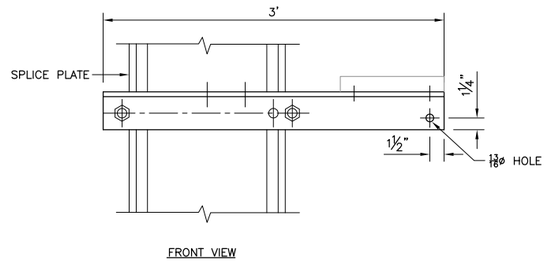












1 POLE CLAMPS (PC3 & PC3L)
1–1/2" = 1'–0"

1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

2 POLE CLAMPS (PC4 & PC4L)
1–1/2" = 1'–0"

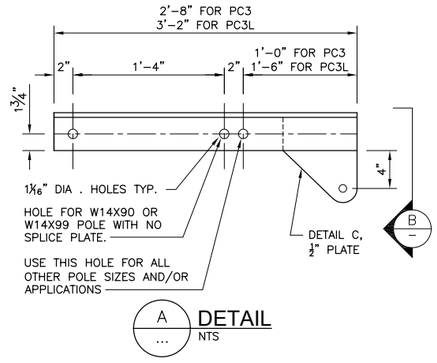
1' 6" 0 1'

SCALE:1–1/2"= 1'–0"

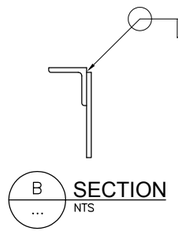
3 POLE CLAMP (PC5)
1–1/2" = 1'–0"

1' 6" 0 1'

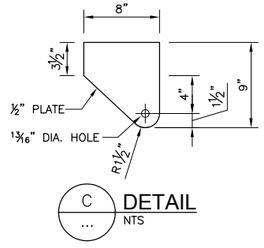
SCALE:1–1/2"= 1'–0"



A DETAIL
NTS



B SECTION
NTS



C DETAIL
NTS

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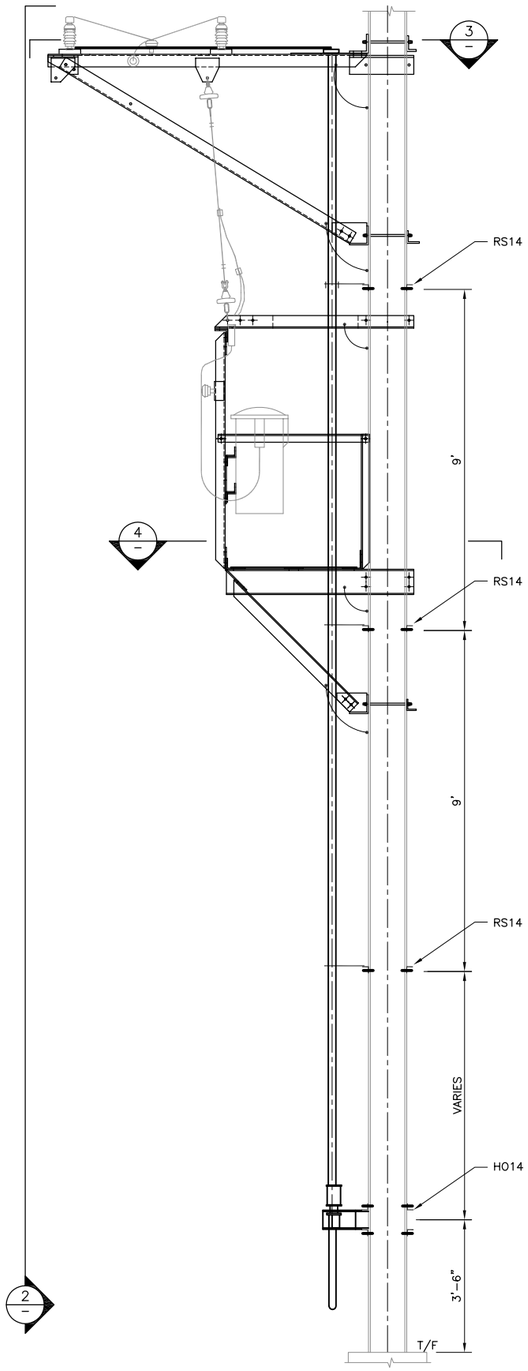
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
SLIDING BRACKET DETAILS

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5215.DWG
Ref. No.:	2011-059
Sheet No:	309 OF 347

S–5215

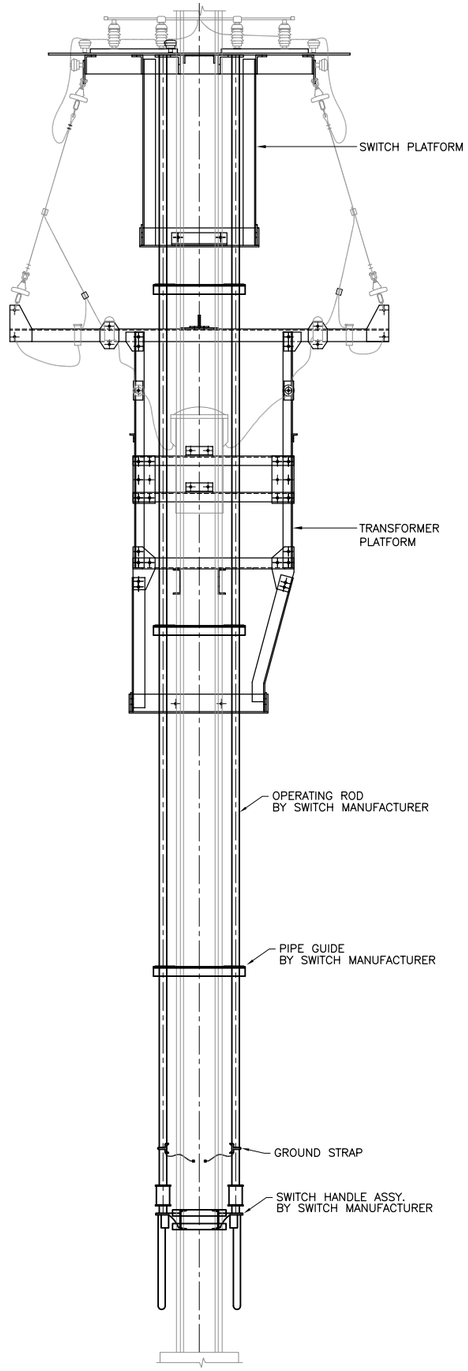
3/14/2016 4:17:49 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5215.dwg



1 DISCONNECT SWITCH PLATFORM

2' 1' 0 2'

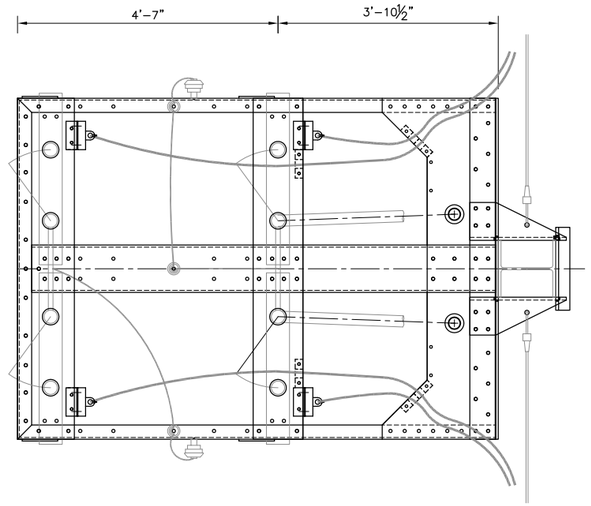
SCALE: 1/2"= 1'-0"



2 ELEVATION

2' 1' 0 2'

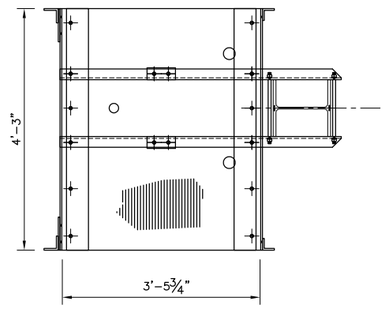
SCALE: 1/2"= 1'-0"



3 DISCONNECT SWITCH PLATFORM

1' 6" 0 1'

SCALE:3/4"=1'-0"



4 TRANSFORMER PLATFORM

1' 6" 0 1'

SCALE:3/4"=1'-0"

BILL OF MATERIALS

MARK	DESCRIPTION	REF. DWG.	QUANTITY
RS14	ROD SUPPORT	S-5225	3
HO14	HAND OPERATOR	S-5225	1
LAD	LADDER ASSEMBLY	S-5224	1
–	SIGNAL POWER SWITCH PLATFORM	S-5220	1
–	SIGNAL POWER TRANSF. PLATFORM	S-5217	1

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL DETAILS

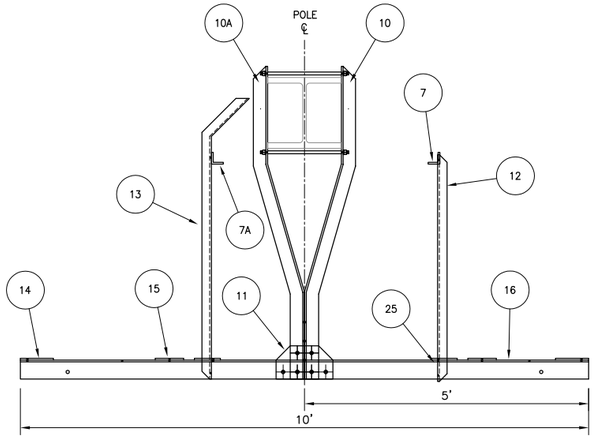
MANUAL OPERATED DISCONNECT SWITCH DETAILS

Recommended: DP	Drawn: VJC	Checked: MJM	Date: 03/17/16

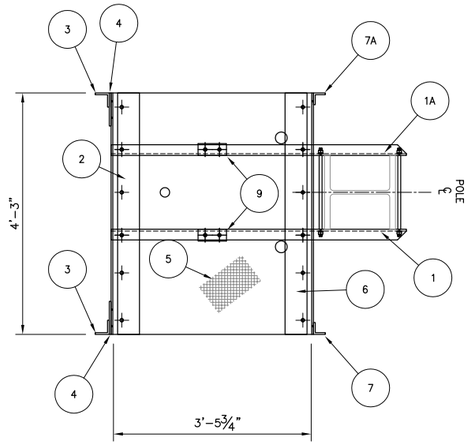
File No.:	2011-059-S-5216.DWG
Ref. No.:	2011-059
Sheet No:	310 OF 347

S-5216

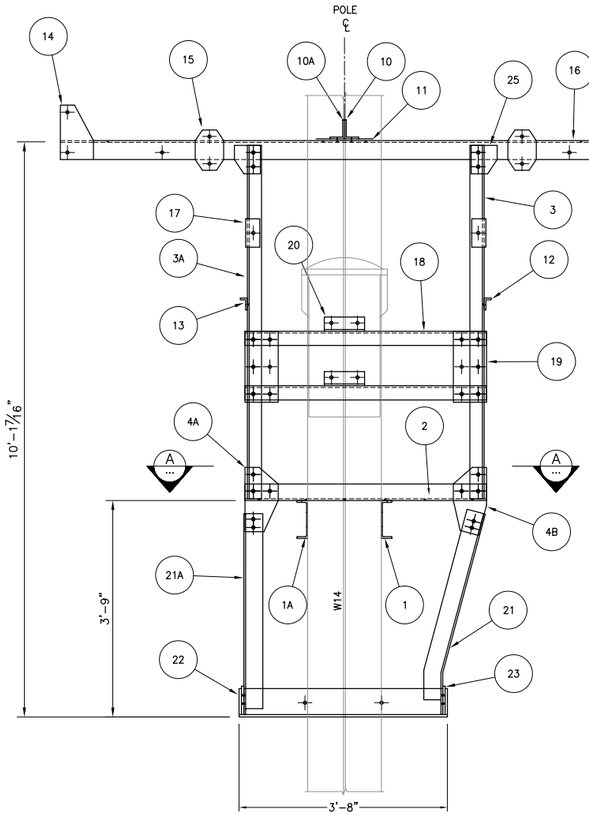
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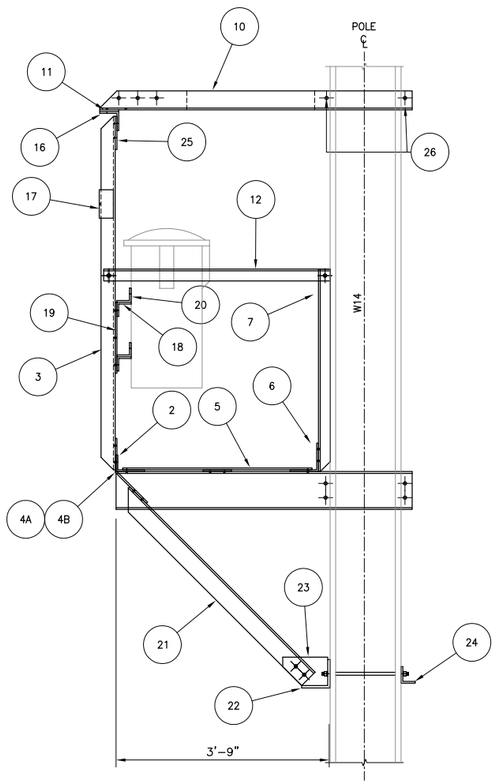
PLAN VIEW
SCALE: 3/4"=1'-0"



A SECTION
SCALE: 3/4"=1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4"=1'-0"



ELEVATION FACING ALONG TRACK
SCALE: 3/4"=1'-0"

BILL OF MATERIAL (STP-14)

ITEM NO.	DESCRIPTION	QTY.
1	PLATFORM SUPPORT CHANNEL C 8 x 11.5	1
2	PLATE SUPPORT ANGLE 6x3 1/2x 3/8 x 4'-3"	1
3	X-ARM SUPPORT ANGLE 3 x 3 x 3/8 x 6'-2 5/8"	1
4A	CONNECTION PLATE 7 x 3/8	1
4B	CONNECTION PLATE 7 x 3/8	1
5	STEEL GRATING, McNICHOLS #SGW-125A-2 OR EQUAL, 3'-5 3/8"x4'-3"	1
6	PLATE SUPPORT ANGLE 6 x 6 x 3/8 x 4'-3"	1
7	HAND RAIL 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	1
8	-	-
9	PL 2 1/2" x 3/8 x 0'-6"	2
10	L 4 x 3 x 3/8	1
11	PL 7 x 3/8 x 1'-0"	1
12	L 2 1/2 x 2 x 3/8 x 3'-11 7/8"	1
13	L 2 1/2 x 2 x 3/8 x 5'-1" ±	1
14	PL 11 1/2 x 3/8 x 0'-7"	2
15	PL 6 x 3/8 x 0'-8 1/2"	2
16	L 4 x 4 x 3/8 x 10'-0"	1
17	L 3 x 3 x 3/8 x 0'-6"	2
18	L 3 x 3 x 3/8 x 4'-3"	2
19	PL 7 x 3/8 x 1'-3"	2
20	L 3 x 3 x 3/8 x 0'- 8 1/2"	2
21	L 4 x 4 x 3/8	1
22	L 6 x 6 x 1/2 x 3'-8"	1
23	PL 6 x 1/2 x 0'-9 1/2"	2
24	L 3 1/2 x 3 x 3/8	1
25	PLATE 6 x 5 1/2" x 3/8"	2
26	CLAMPING BOLT 1" ø 18" LONG, 4" THREAD	8
	WITH NUTS & LOCK WASHERS	
3A	X-ARM SUPPORT ANGLE 3 x 3 x 3/8 x 6'-2 5/8"	1
7A	HAND RAIL 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	1
10A	L 4 x 3 x 3/8	1
21A	L 4 x 4 x 3/8	1
1A	PLATFORM SUPPORT CHANNEL C 8 x 11.5	1
	5/8"ø BOLTS WITH NUTS AND WASHERS 1 3/4" LONG	27
	3/4"ø BOLTS WITH NUTS AND WASHERS 2 1/4" LONG	40
	5/8"ø FLAT HEADED CTS'K BOLT 1 11/16" LONG	2

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING ET-5216.
2. FOR POLE SIZE, POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5218 AND S-5219.
4. VENDOR SHALL DELIVER SIGNAL POWER TRANSFORMER AND DISCONNECT SWITCH PLATFORMS LOOSELY ASSEMBLED.

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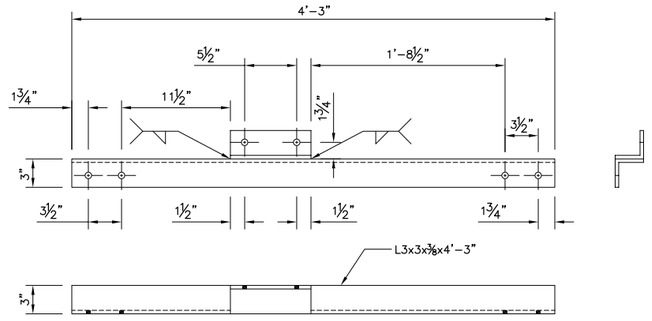
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
6.9KV SIGNAL POWER TRANSFORMER PLATFORM

Recommended:	DP	Drawn:	VJC	Checked: MJM	Date: 03/17/16

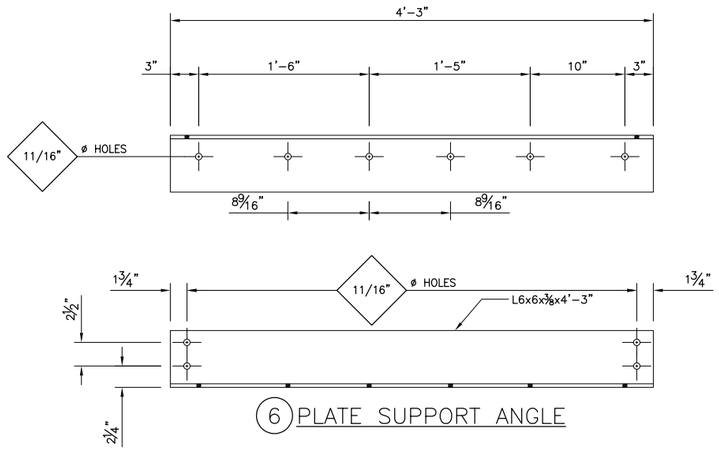
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Ref. No.:	2011-059
Sheet No:	311 OF 347

S-5217

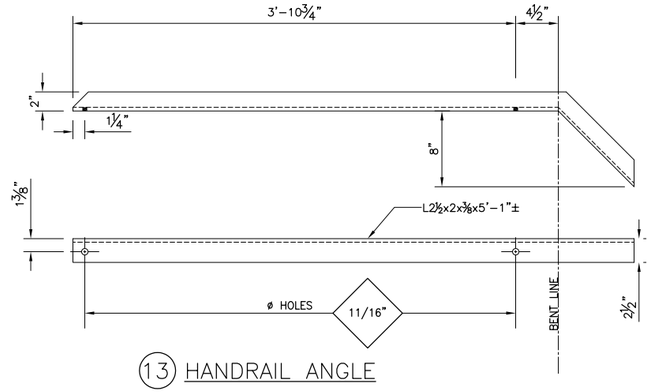
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3/14/2016
4:17:58 PM



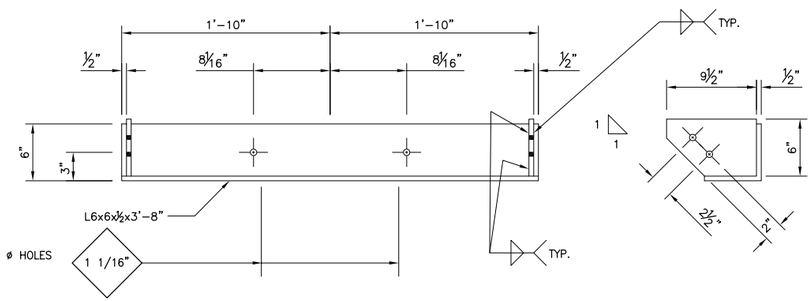
(18) TRANSFORMER SUPPORT ANGLE AND ITEM (20)



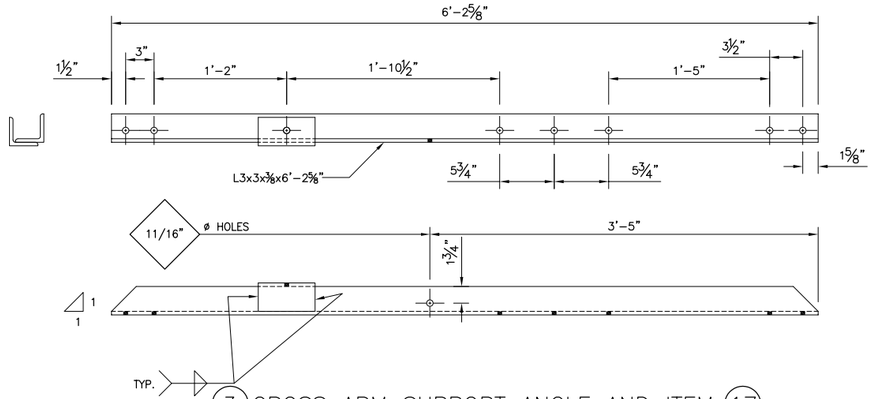
(6) PLATE SUPPORT ANGLE



(13) HANDRAIL ANGLE

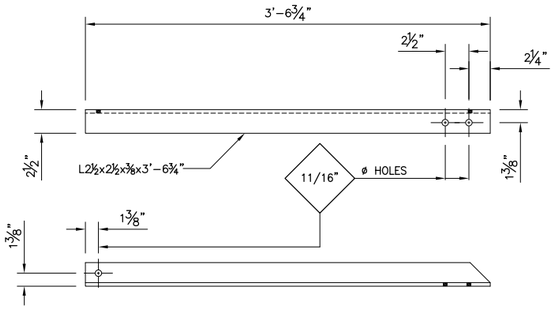


(22) CLAMP ANGLE AND ITEM (23)



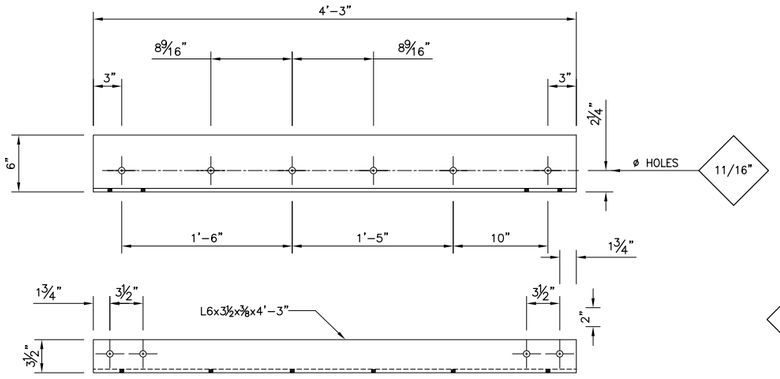
(3) CROSS ARM SUPPORT ANGLE AND ITEM (17)

(3A) AS DRAWN OPPOSITE HAND

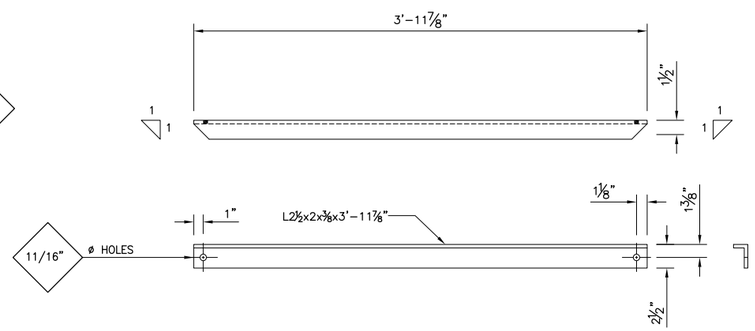


(7) HANDRAIL SUPPORT ANGLE

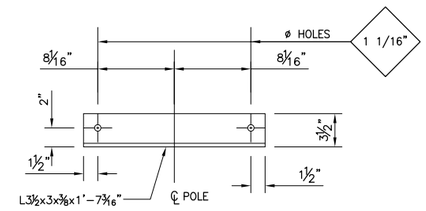
(7A) AS DRAWN OPPOSITE HAND



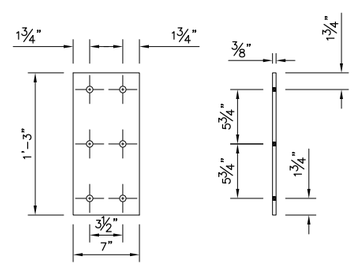
(2) CLAMP ANGLE



(12) HANDRAIL ANGLE



(24) CLAMP ANGLE



(19) CONNECTION PLATE

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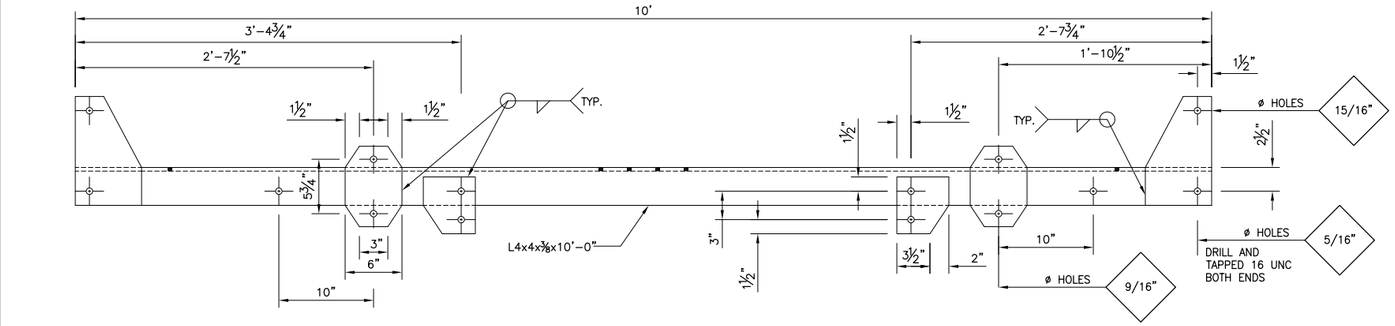
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER TRANSFORMER PLATFORM (SHEET 1 OF 2)

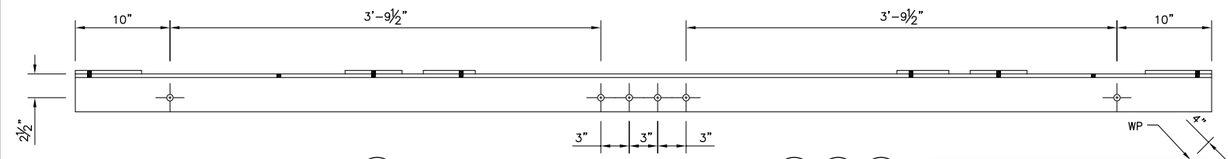
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File No.:	2011-059-S-5218.DWG
Ref. No.:	2011–059
Sheet No:	312 OF 347

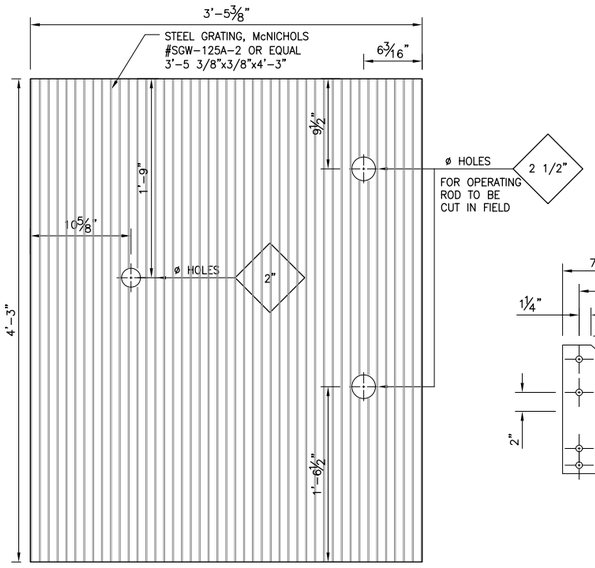
S–5218

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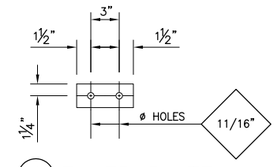




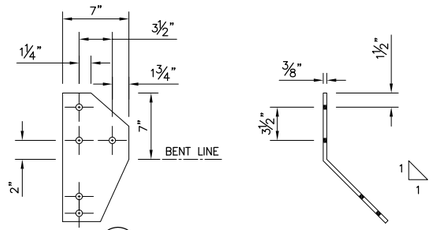
16 CROSS ARM ANGLE AND ITEMS 14 15 25



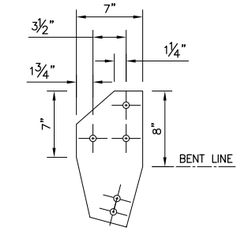
5 STEEL GRATING



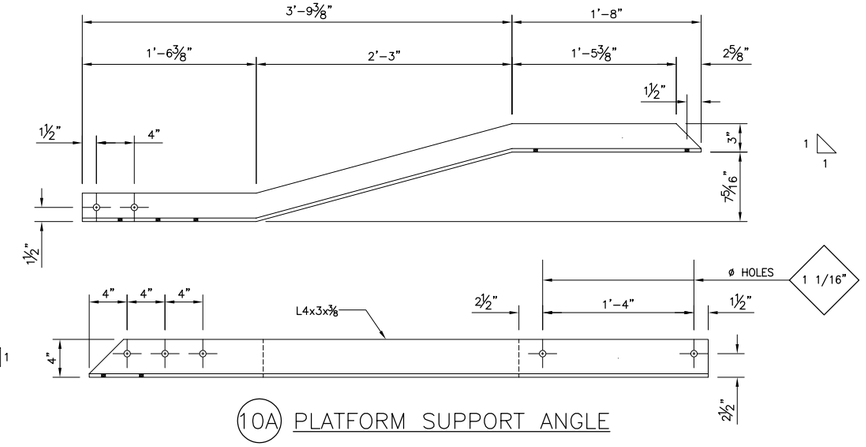
9 FILLER PLATE



4A CONNECTION PLATE

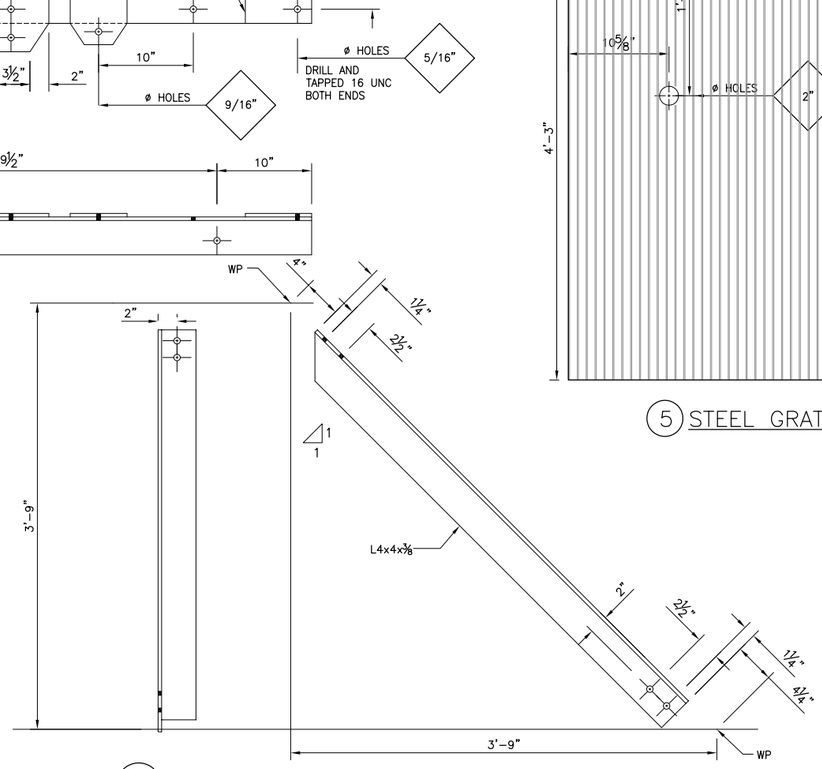


4B CONNECTION PLATE

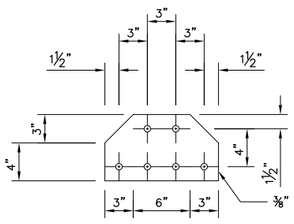


10A PLATFORM SUPPORT ANGLE

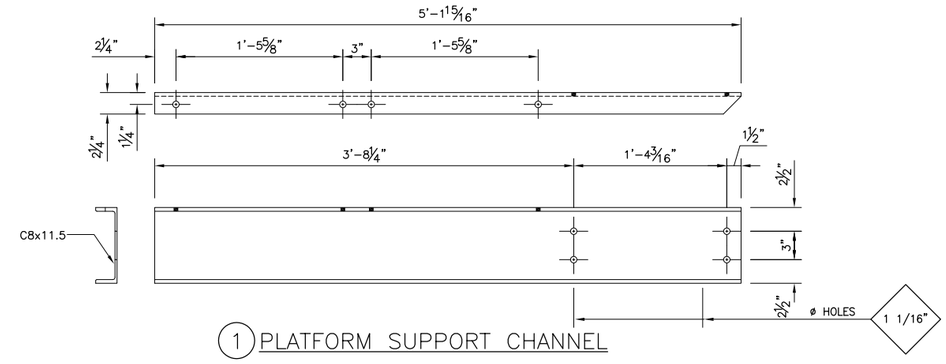
10 PLATFORM SUPPORT ANGLE



21A PLATFORM BRACING ANGLE

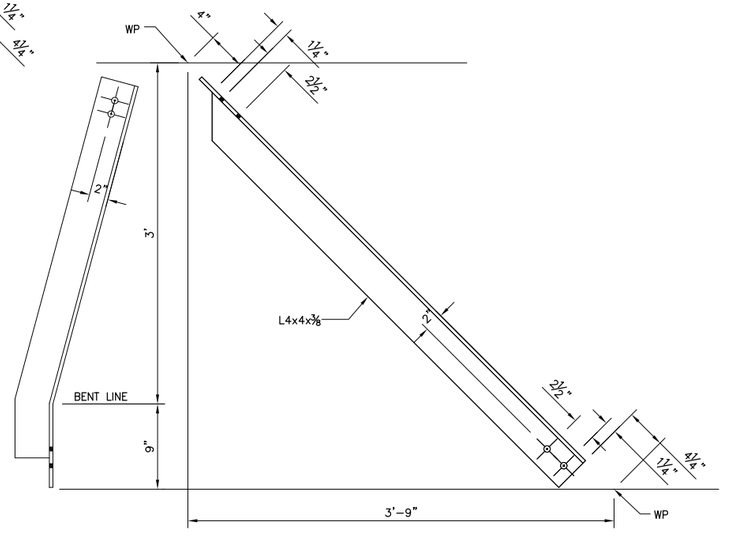


11 CONNECTION PLATE



1 PLATFORM SUPPORT CHANNEL

1A AS DRAWN OPPOSITE HAND



21 PLATFORM BRACING ANGLE

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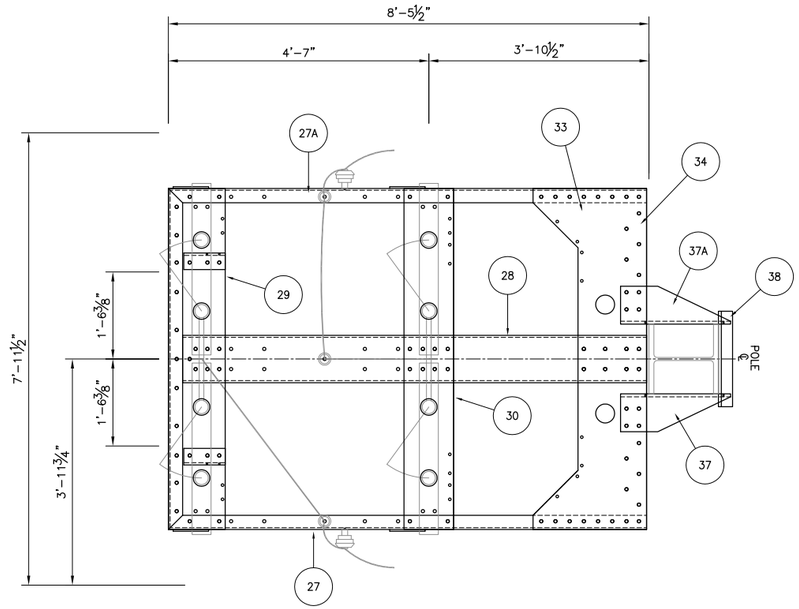
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER TRANSFORMER PLATFORM (SHEET 2 OF 2)

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

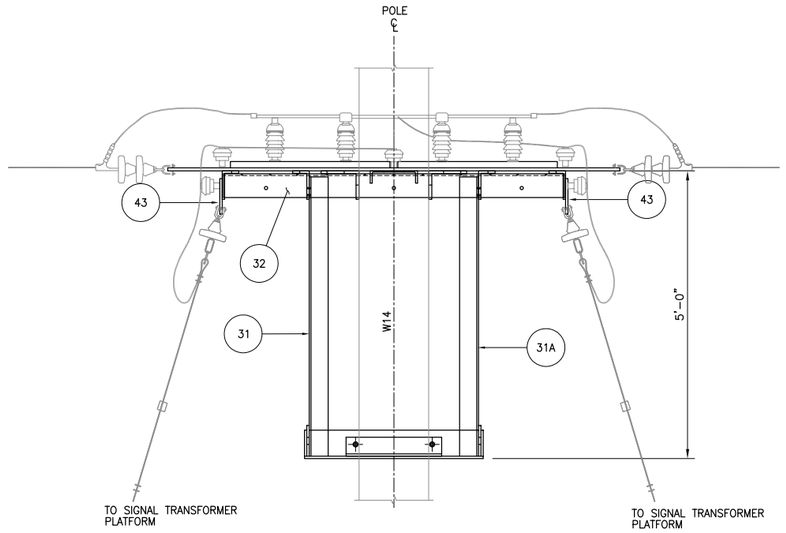
File No.:	2011-059-S-5219.DWG
Ref. No.:	2011-059
Sheet No:	313 OF 347

S-5219

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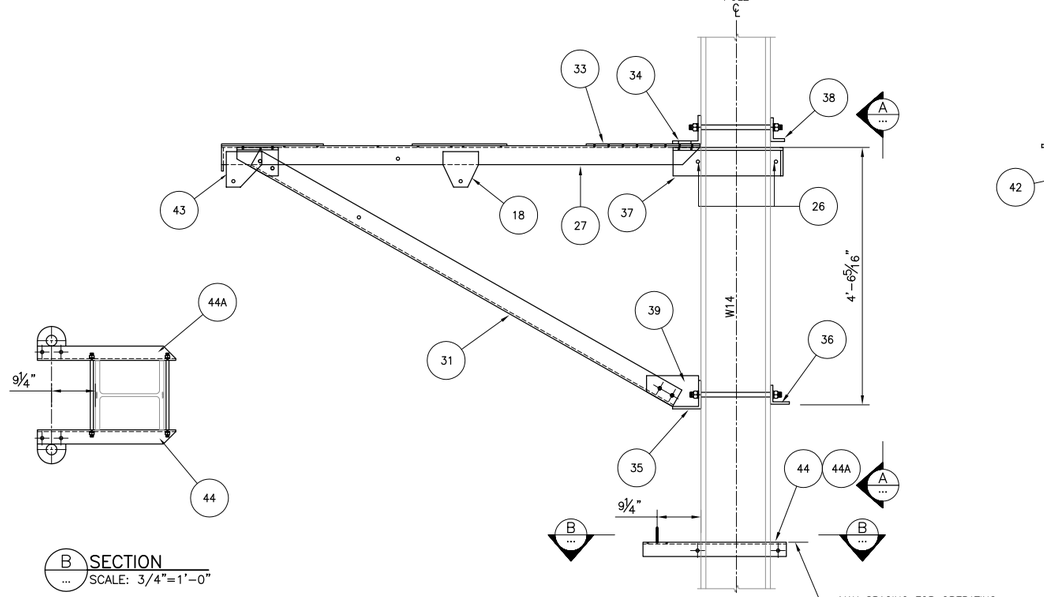


PLAN VIEW
SCALE: 3/4"=1'-0"



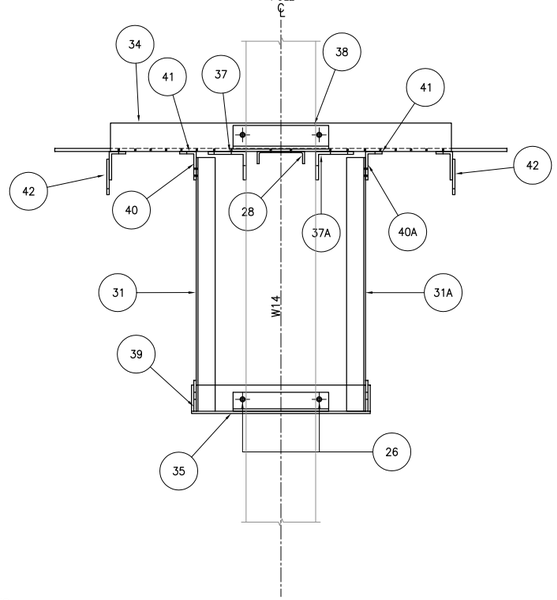
ELEVATION FACING ACROSS TRACK
SCALE: 3/4"=1'-0"

BILL OF MATERIAL (SSP-14)		
ITEM	DESCRIPTION	QTY
26	CLAMPING BOLT 1"ø, 18" LONG 4" THREAD	6
	WITH NUTS AND WASHERS	
27	L 4 x 3 x 3/8 x 8'-5"	1
28	C 10 x 15.3 x 8'-2"	1
29	PL 12 x 3/8 x 7'-11 1/2"	1
30	PL 10 1/2 x 3/8 x 7'-11 1/2"	1
31	L 4 x 4 x 3/8 x 8'-6 7/8"	1
32	L 5 x 3 x 3/8 x 6'-0"	1
33	PL 14 1/2 x 3/8 x 6'-0"	1
34	L 6 x 6 x 5/8 x 6'-0"	1
35	L 6 x 6 x 1/2 x 3'-2"	1
36	L 4 x 4 x 1/2 x 1'-8 3/16"	1
37	L 8 x 6 x 5/8 x 1'-8 3/8"	1
38	L 5 x 3 x 5/8 x 1'-8 3/16"	1
39	PL 11 x 6 1/2 x 1/2	2
40	L 6 x 3 1/2 x 1/2 x 8 3/4	1
41	PL 3 1/2 x 3/8 x 8 3/4	2
42	PL 7 1/2 x 7 1/2 x 1/2	2
43	PL 7 1/2 x 7 1/2 x 1/2	2
38A	L 8 x 6 x 5/8 x 1'-8 3/8"	1
42A	PL 6 x 3 1/2 x 1/2 x 9 1/2	1
27A	L 4 x 3 x 3/8 x 8'-5"	1
31A	L 4 x 4 x 3/8 x 8'-11 1/2"	1
–	3/4" ø BOLTS 2 1/4" LG. W/ NUTS & WASHERS	90
44&44A	ANGLES, 1 SET, 3 x 3 x 3/8 x 2'-3 1/4"	4
45	CLAMPING BOLT 3/4"ø, 18" LONG 4" THREAD	8
	WITH NUTS AND LOCK WASHERS	



B SECTION
SCALE: 3/4"=1'-0"

ELEVATION FACING ALONG TRACK
SCALE: 3/4"=1'-0"



A SECTION
SCALE: 3/4"=1'-0"

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5216.
2. FOR POLE SIZE, SEE POLE SCHEDULE ON STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5221 AND S-5222.
4. VENDOR SHALL DELIVER SIGNAL POWER TRANSFORMER AND DISCONNECT SWITCH PLATFORMS LOOSELY ASSEMBLED.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

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AECOM

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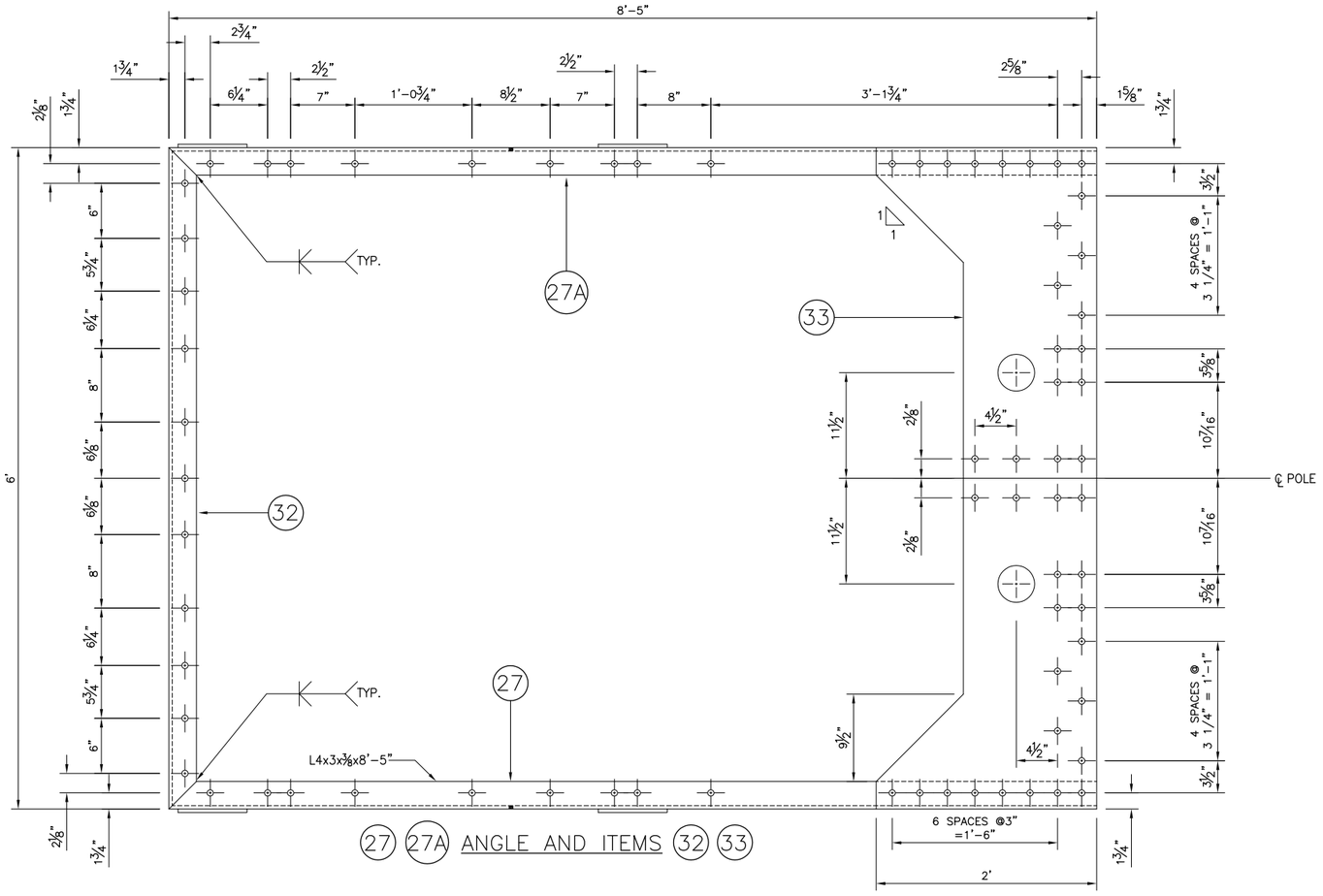
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER DISCONNECT SWITCH PLATFORM

Recommended: DP | Drawn: VJC | Checked: MJM | Date: 03/17/16

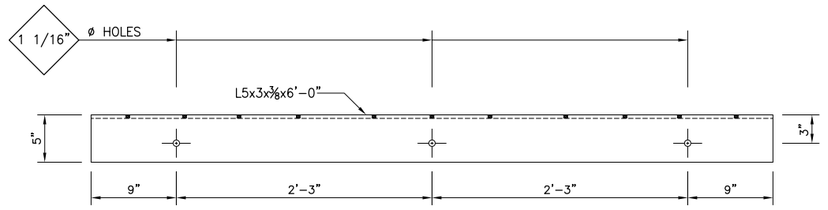
File No.:	2011-059-S-5220.DWG
Ref. No.:	2011-059
Sheet No:	314 OF 347

S-5220

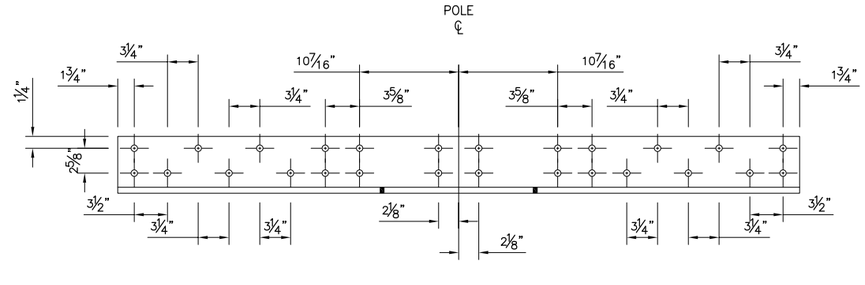
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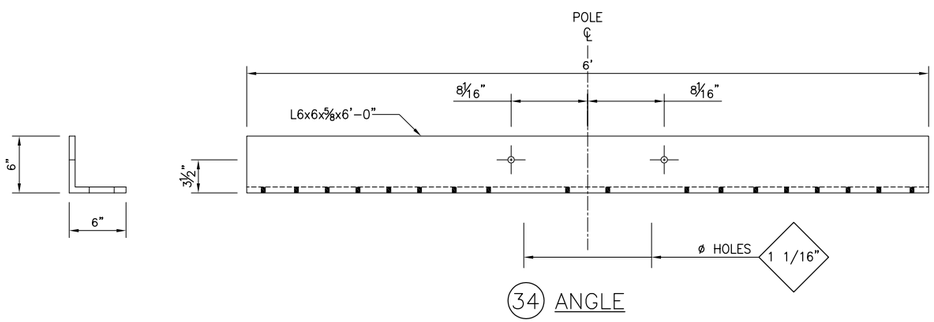


(27) (27A) ANGLE AND ITEMS (32) (33)

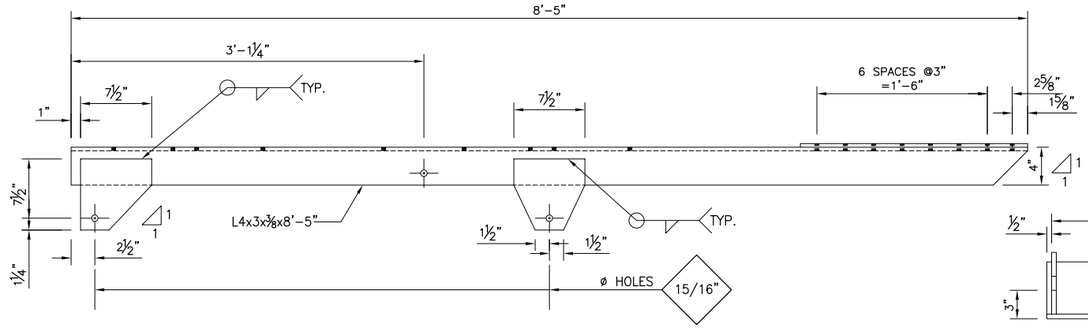


(32) ANGLE



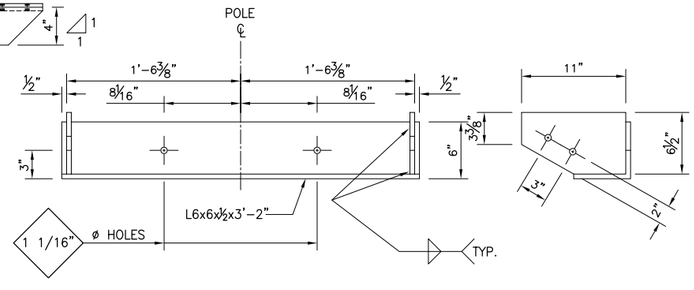


(34) ANGLE

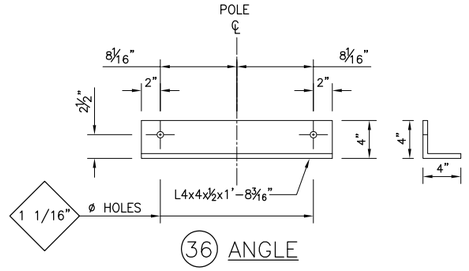


(27) ANGLE AND ITEMS (42) (43)

(27A) AS DRAWIN OPPOSITE HAND



(35) ANGLE AND ITEM (39)



(36) ANGLE

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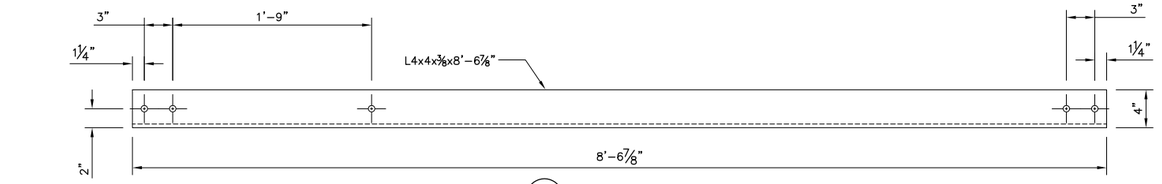
STRUCTURAL – TYPICAL DETAILS – 6.9KV SIGNAL POWER DISCONNECT SWITCH PLATFORM (SHEET 1 OF 2)

Recommended:	Drawn:	Checked:	Date:
DP	VJC	MJM	03/17/16

File No.:	2011-059-S-5221.DWG
Ref. No.:	2011-059
Sheet No:	315 OF 347

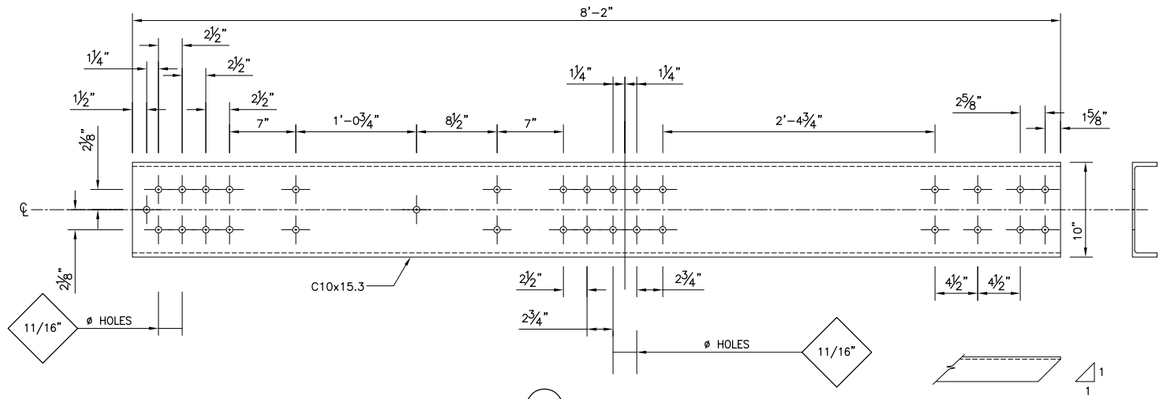
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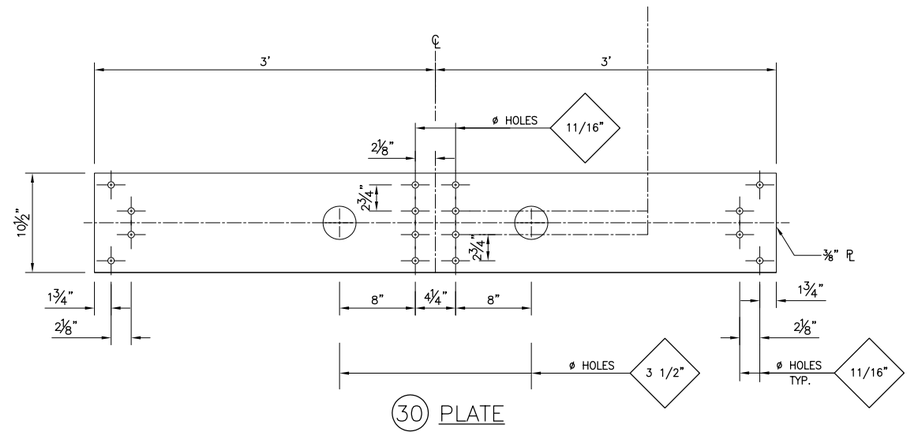


31 ANGLE

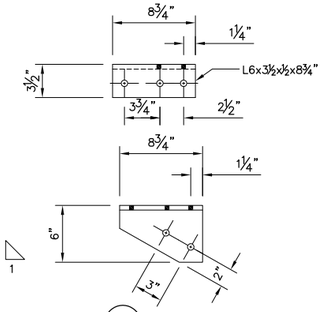
31A AS DRAWN OPPOSITE HAND



28 CHANNEL

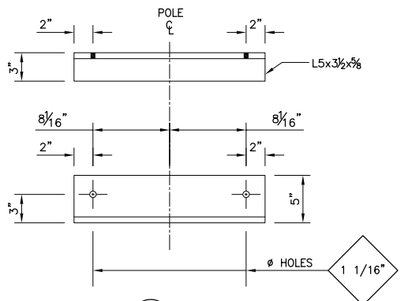


30 PLATE

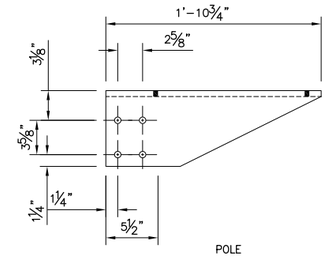


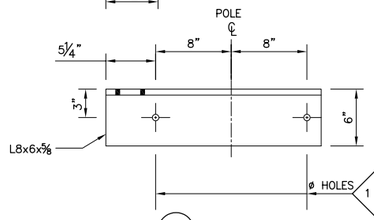
40 ANGLE

40A AS DRAWN OPPOSITE HAND



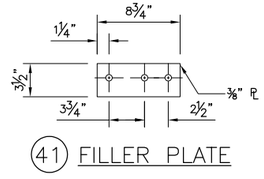
38 ANGLE



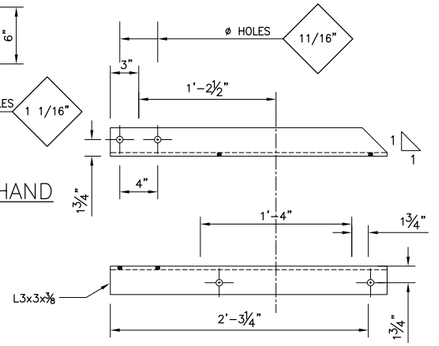


37 ANGLE

37A AS DRAWN OPPOSITE HAND

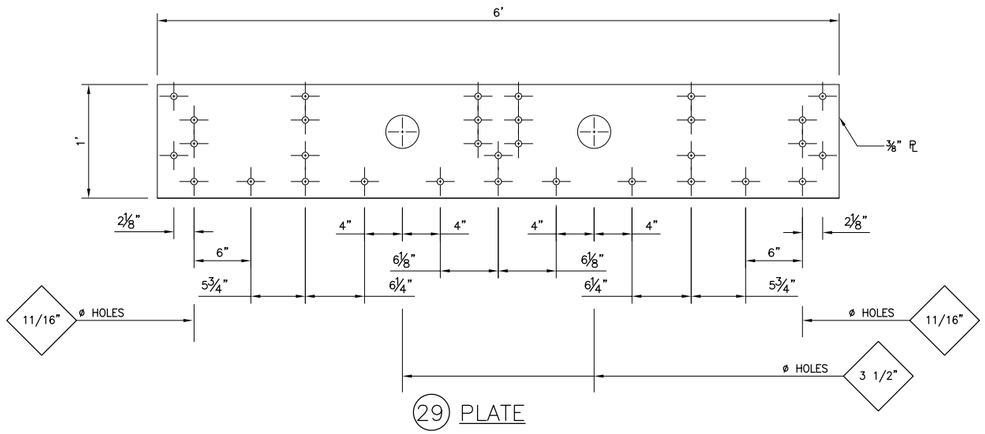


41 FILLER PLATE



44 OPERATING ROD SUPPORT ANGLE

44A AS DRAWN OPPOSITE HAND



29 PLATE

3/15/2016 8:39:32 AM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5222.dwg

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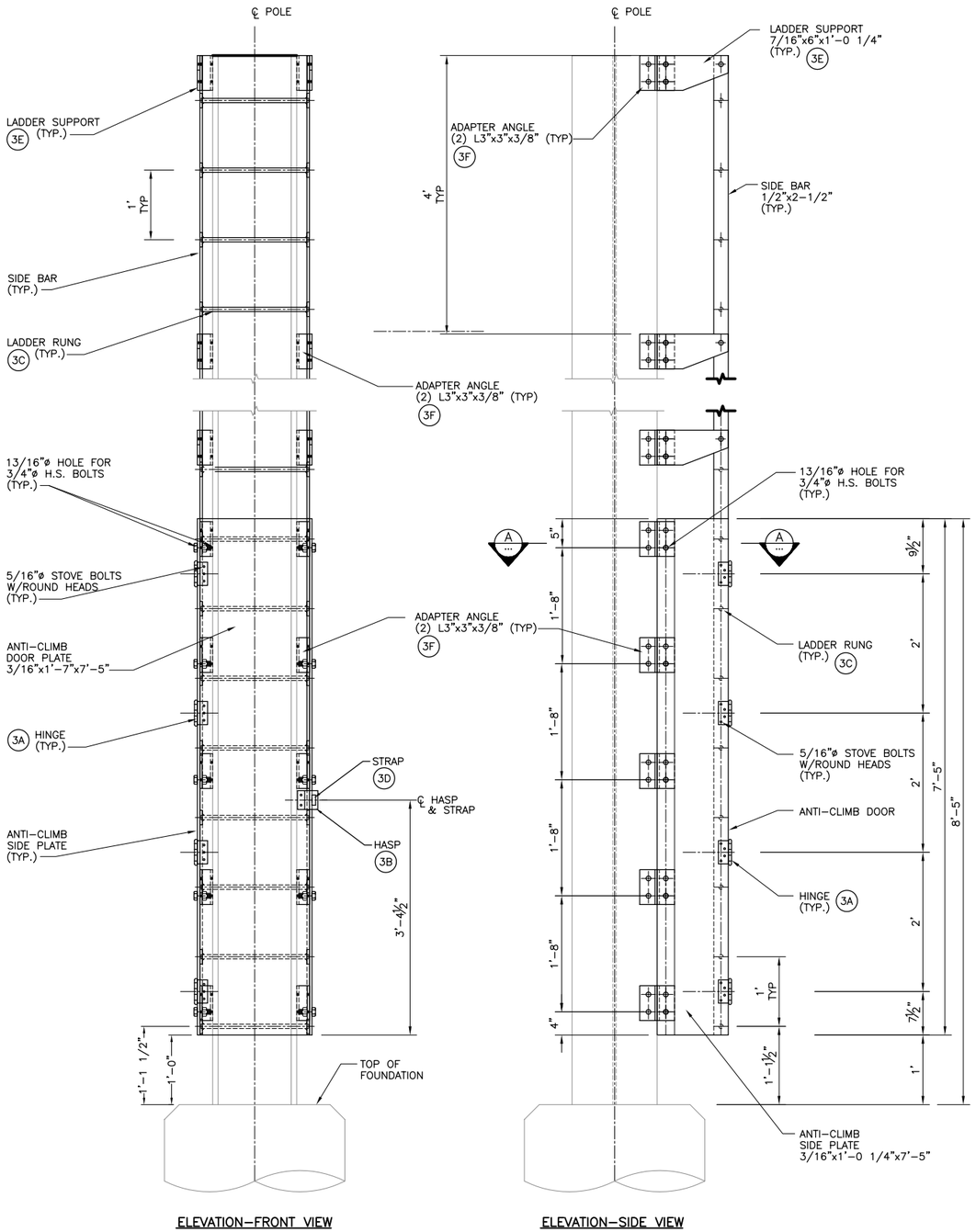
IN ASSOCIATION WITH Baker AECOM

BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – SIGNAL POWER
DISCONNECT SWITCH PLATFORM (SHEET 2 OF 2)

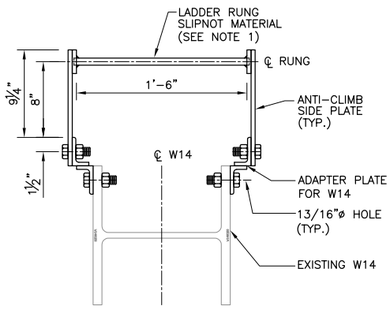
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Ref. No.:	2011-059
Sheet No:	316 OF 347

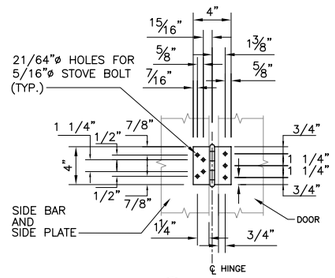
S-5222



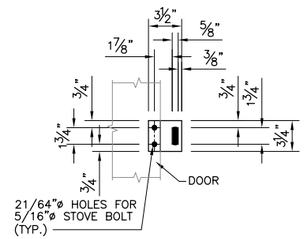
LADDER ASSEMBLY (LAD)
SCALE: 1"=1'-0"



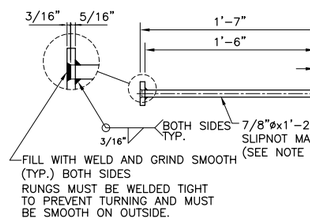
A SECTION
SCALE: 1/2"=1'-0"



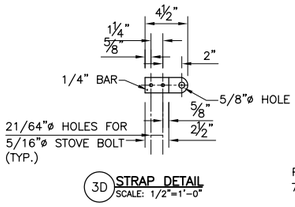
3A HINGE DETAIL
SCALE: 1/2"=1'-0"



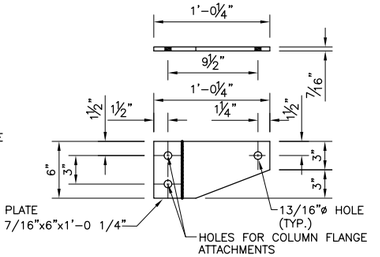
3B HASP DETAIL
SCALE: 1/2"=1'-0"



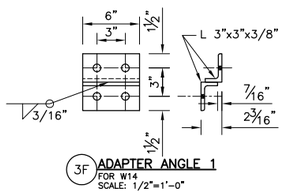
3C LADDER RUNG DETAIL
SCALE: 1/2"=1'-0"



3D STRAP DETAIL
SCALE: 1/2"=1'-0"



3E LADDER SUPPORT DETAIL
SCALE: 1/2"=1'-0"



3F ADAPTER ANGLE 1
FOR W14
SCALE: 1/2"=1'-0"

NOTE:

1. RUNGS TO BE SLIPNOT MATERIAL
   1-800-754-7668
   OR APPROVED EQUAL.

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PHILADELPHIA, PA 19103

IN ASSOCIATION WITH Baker AECOM

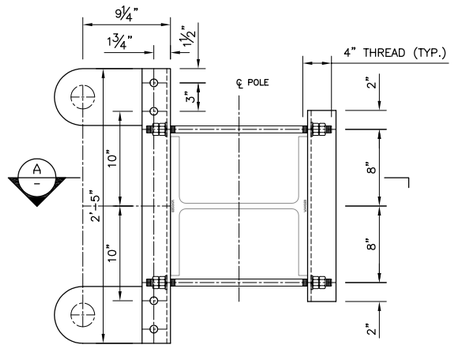
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
LADDER DETAILS

File No.:	2011-059-S-5224.DWG
Ref. No.:	2011-059
Sheet No:	317 OF 347

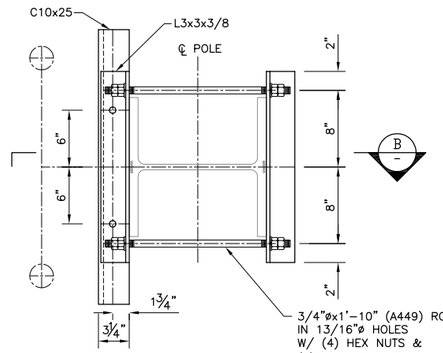
S-5224

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

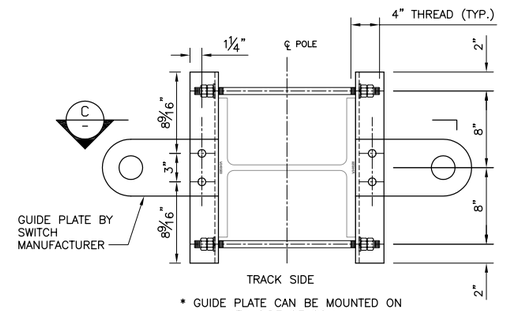
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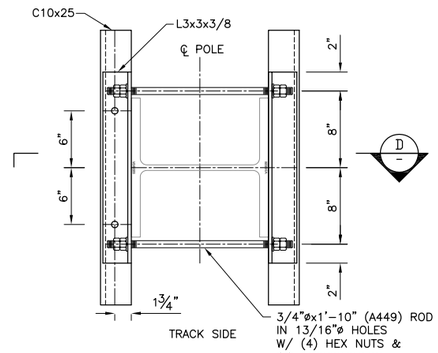
1 / S-5225 DOUBLE ROD SUPPORT (DRS14)
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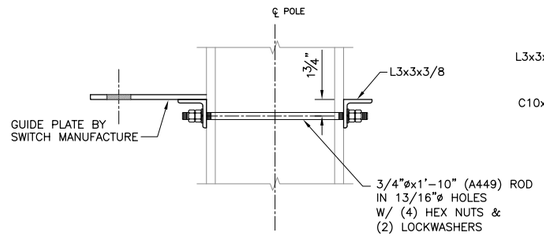
2 / S-5225 HAND OPERATOR SUPPORT (HO14)
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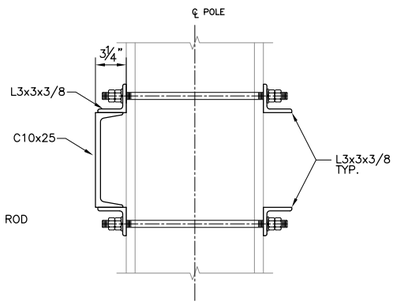


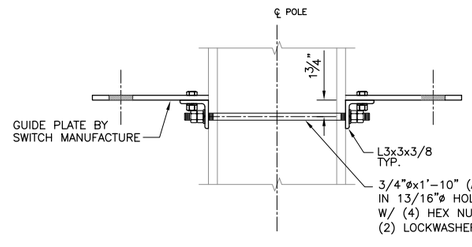
3 / S-5225 ROD SUPPORT (RS14)
SCALE: 1 1/2"=1'-0"

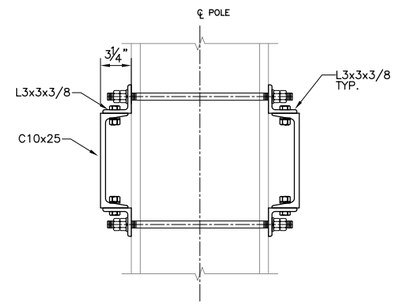


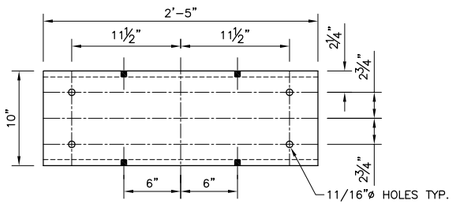
4 / S-5225 MOTOR OPERATOR SUPPORT (MOS14)
SCALE: 1 1/2"=1'-0"



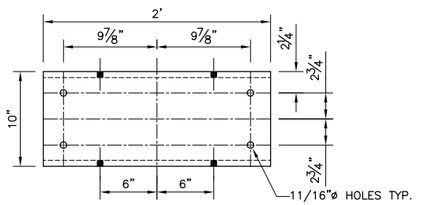








E / S-5225 CHANNEL DETAIL FOR HAND OPERATOR
SCALE: 1 1/2"=1'-0"



F / S-5225 CHANNEL DETAIL FOR MOTOR OPERATOR
SCALE: 1 1/2"=1'-0"

3/14/2016 4:18:30 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5225.dwg

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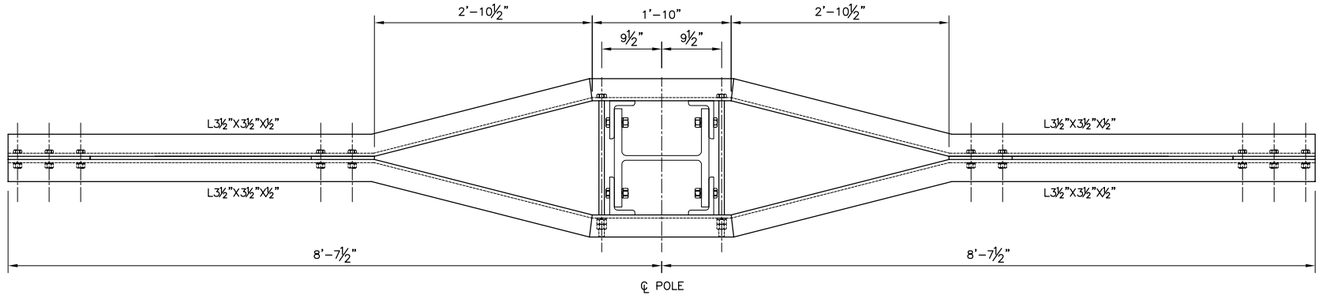
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
OPERATING ROD AND CONDUIT SUPPORT

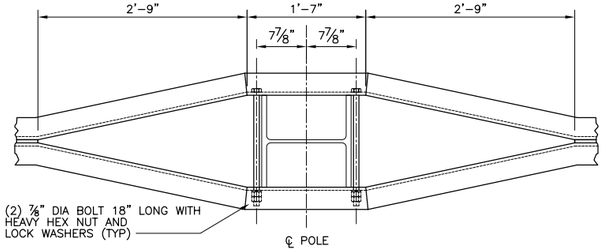
Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5225.DWG
Ref. No.:	2011–059
Sheet No:	318 OF 347

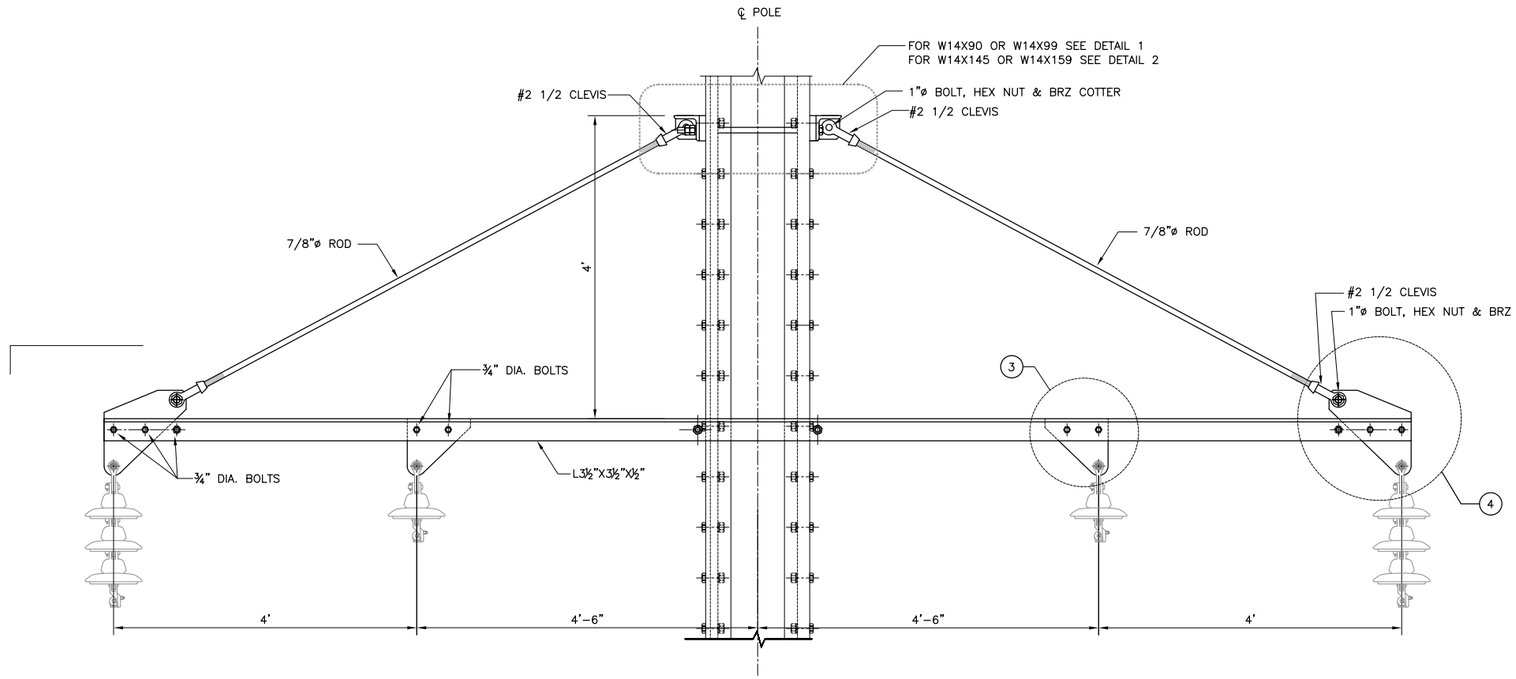
S–5225



A SECTION (FOR W14X145, W14X159)
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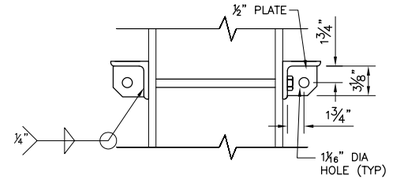
A SECTION (FOR W14X90, W14X99)
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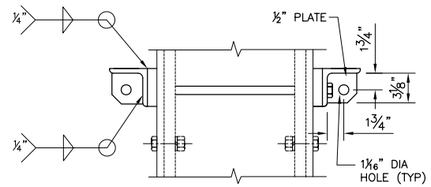
FEEDER BRACKET (FB1)
1' 0 1' 2'
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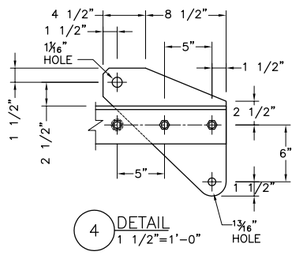
NOTE:

1. SEE DRAWING S-5109 FOR INFORMATION ON COLUMN BRACING

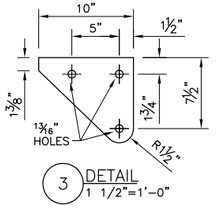


1 DETAIL
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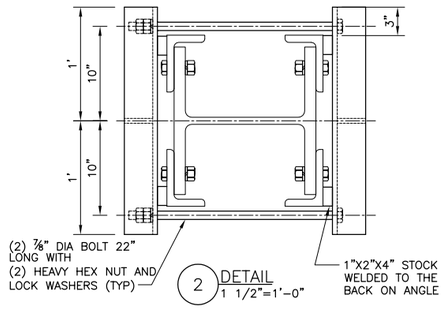




4 DETAIL
1 1/2"=1'-0"



3 DETAIL
1 1/2"=1'-0"



2 DETAIL
1 1/2"=1'-0"

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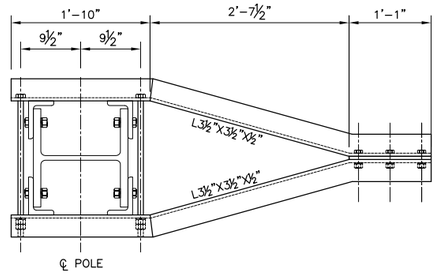
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
FEEDER BRACKET DETAILS (FB1)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

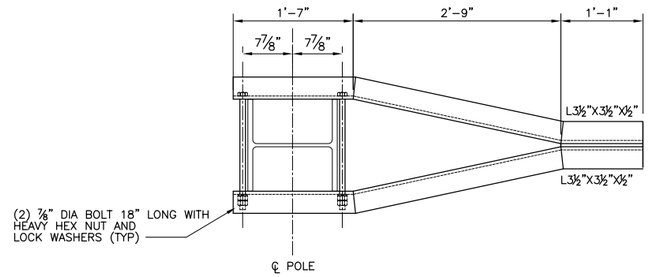
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Ref. No.:	2011-059
Sheet No:	319 OF 347

S-5226

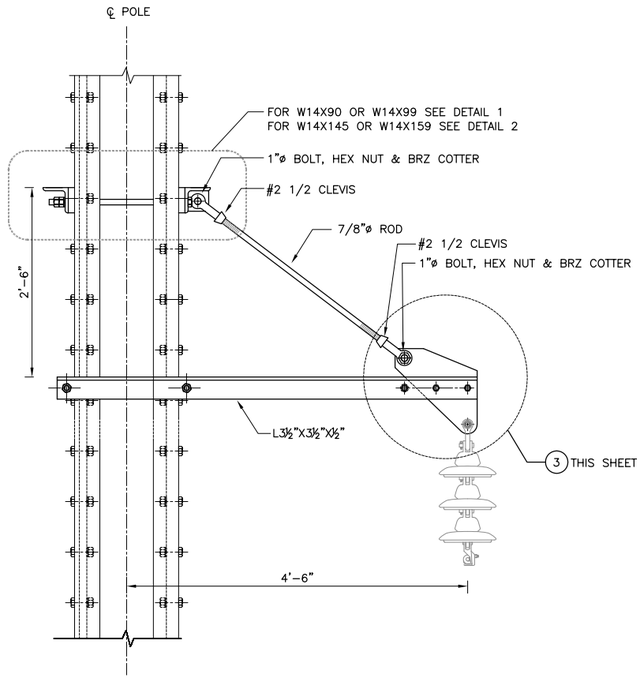
3/14/2016 4:18:36 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5226.dwg



A SECTION (FOR W14X145, W14X159)
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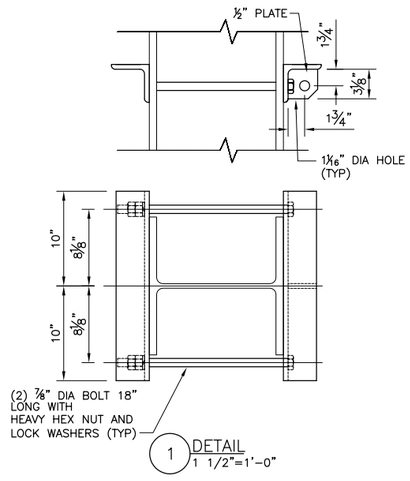
A SECTION (FOR W14X90, W14X99)
SCALE: 1"=1'-0"

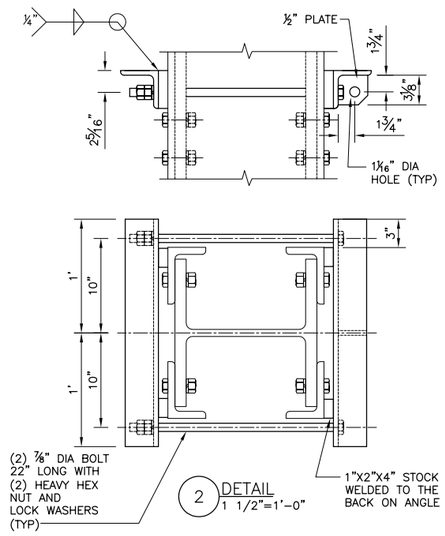


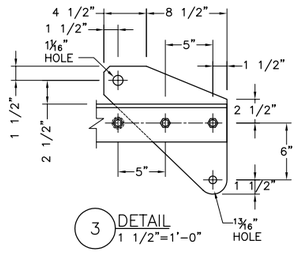
PECO DEADEND BRACKET (FB2)

1' 0 1' 2'

SCALE: 1"=1'-0"







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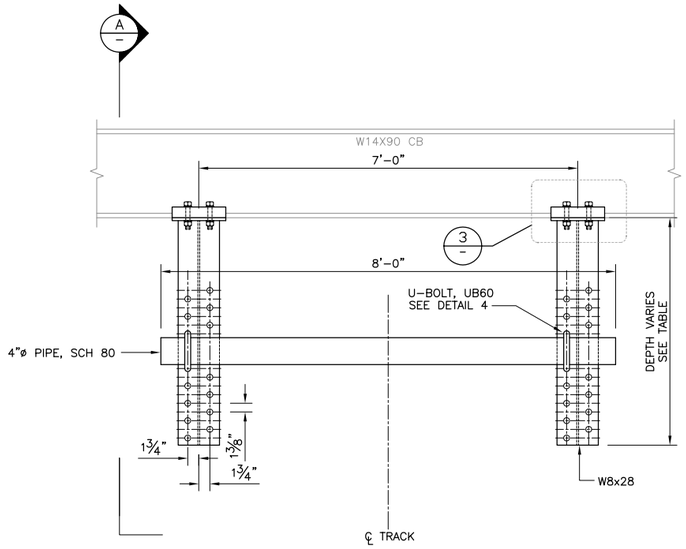
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BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
FEEDER BRACKET DETAILS (FB2)

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5227.DWG
Ref. No.:	2011–059
Sheet No:	320 OF 347

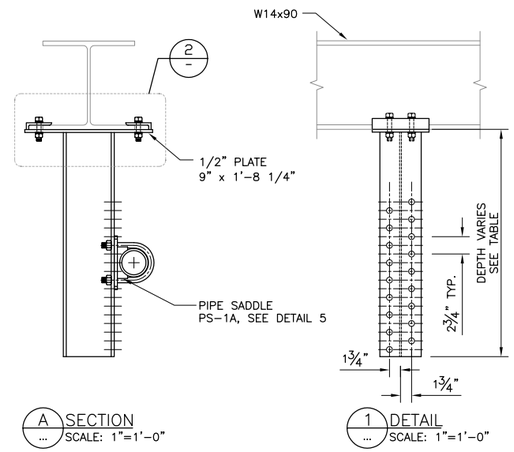
S–5227



UNDER BRIDGE BRACKET ASSEMBLY (UBA1)

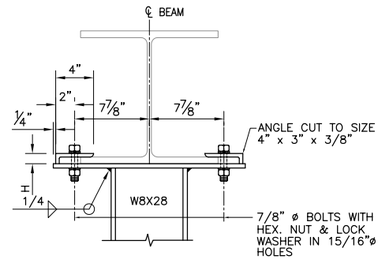
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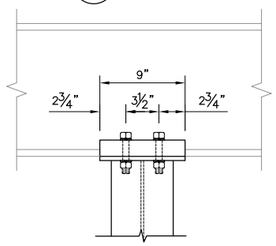


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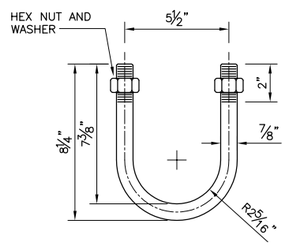
1 DETAIL
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2 DETAIL
SCALE: 1 1/2"=1'-0"

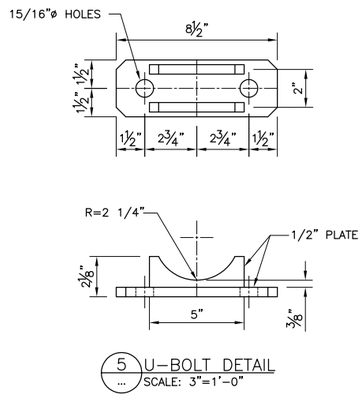


3 DETAIL
SCALE: 1 1/2"=1'-0"



4 U-BOLT DETAIL
SCALE: 3"=1'-0"

U-BOLT (UB60)



5 U-BOLT DETAIL
SCALE: 3"=1'-0"

PIPE SADDLE (PS1A)

BRACKET DEPTH TABLE

STRUCTURE	TRACK 1	TRACK 2	TRACK 3	TRACK 4
T-441	5'-6"	5'-6"	5'-6"	5'-6"
T-396	2'-6"	2'-6"	2'-6"	2'-6"
T-395	2'-6"	2'-6"	2'-6"	2'-6"
T-365	3'-6"	3'-6"	3'-6"	3'-6"
T-339A	3'-8"	3'-8"	3'-8"	4'-6"
T-228	3'-6"	3'-6"	3'-6"	3'-6"
T-227	3'-0"	3'-0"	3'-0"	3'-0"
T-165	5'-4"	5'-0"	5'-0"	5'-0"
T-164	5'-6"	5'-0"	5'-0"	5'-0"

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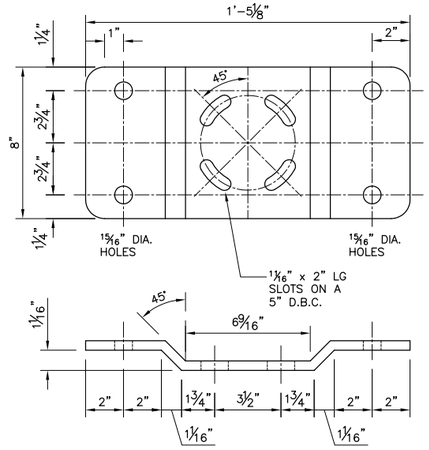
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
UNDER BRIDGE BRACKET ASSEMBLY (UBA-1)

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

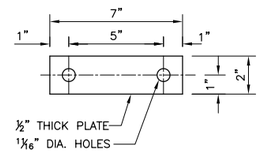
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Ref. No.:	2011-059
Sheet No:	321 OF 347

S-5228

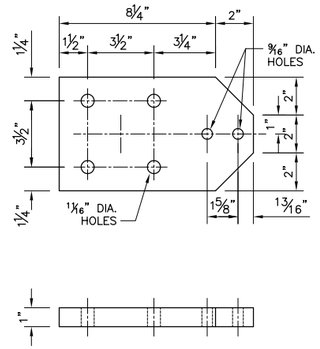
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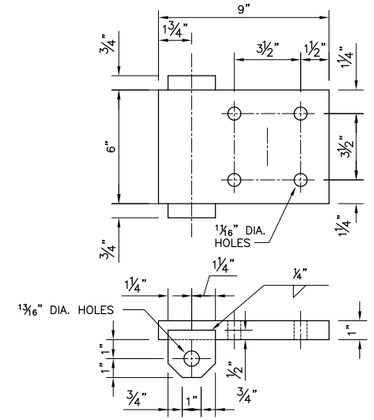
1 S-5229 BENT PLATE (TP1)
SCALE: 3"=1'-0"



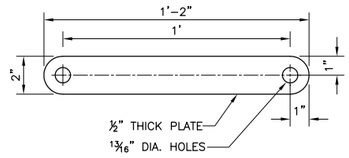
2 S-5229 TOP PLATE (TP2)
SCALE: 3"=1'-0"



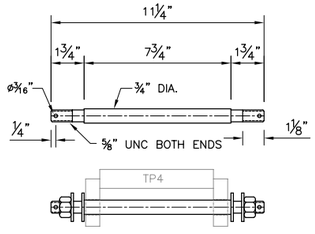
3 S-5229 PLATE FOR PULL OFF ARMS (TP3)
SCALE: 3"=1'-0"



4 S-5229 PLATE FOR PULL OFF ARMS (TP4)
SCALE: 3"=1'-0"



5 S-5229 STEEL STRAP FOR TDA3 (PART #215)
SCALE: 3"=1'-0"



NOTE:
INCLUDE (2) HEX NUTS, (4) FLAT WASHERS, (2) COTTER PINS

6 S-5229 GALVANIZED 3/4" DIA. BOLT (PART #261)
SCALE: 3"=1'-0"

1' 6" 0 1'

SCALE: 3"= 1'-0"

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OFFICE OF
Chief Engineer
Engineering
National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

Approved	Date

Burns
BURNS ENGINEERING, INC. | 215 979-7700
TWO COMMERCE SQUARE, 2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

IN ASSOCIATION WITH

Baker
AECOM

BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS
MISC STEEL DETAILS

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5229.DWG
Ref. No.:	2011-059
Sheet No:	322 OF 347

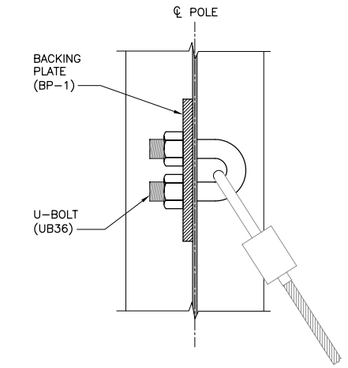
S-5229

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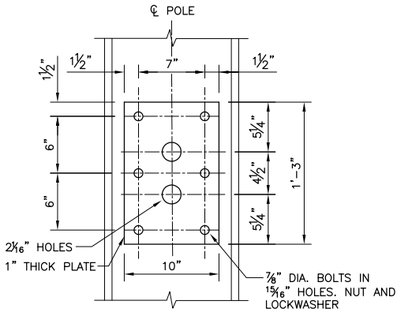
DG SCHEDULE		
	DISTANCE FROM TOP OF POLE	
STRUCTURE #	NORTH POLE	SOUTH POLE
T-228	1'-6"	1'-6"
T-226	1'-6"	1'-6"
T-194	1'-6"	1'-6"
T-191	1'-6"	1'-6"
T-166	1'-6"	1'-6"
T-163	1'-6"	1'-6"
T-155	1'-6"	1'-6"
T-152	1'-6"	1'-6"
T-135	1'-6"	1'-6"
T-131	1'-6"	1'-6"
T-116	1'-6"	
T-112A		1'-6"
T-110		1'-6"
SP-18A	19'-10" BOTH SIDES)	
SP-15A	1'-6" (BOTH SIDES)	

DG-1 SCHEDULE		
	DISTANCE FROM BOTTOM OF POLE BASE PL	
STRUCTURE #	NORTH POLE	SOUTH POLE
T-236	30'-7"	30'-7"
T-233	24'-0"	24'-0"
T-233	21'-0"	21'-0"
T-230	18'-3"	18'-8"
T-127	27'-11"	
T-124	24'-3"	

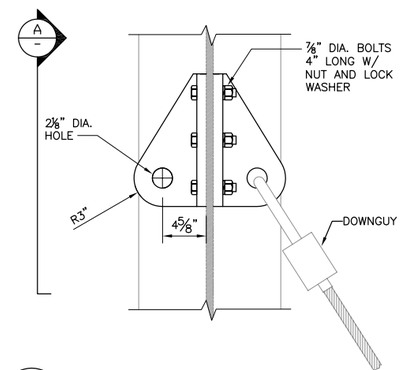
DOWN GUY SCHEDULE



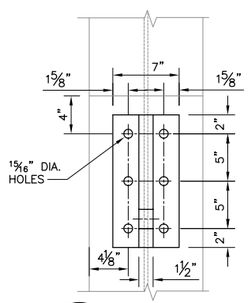
1 / S-5230 DOWN GUY CONNECTION DETAIL
SCALE: 1 1/2"=1'-0"
1' 6" 0 1'
SCALE:1-1/2"= 1'-0"



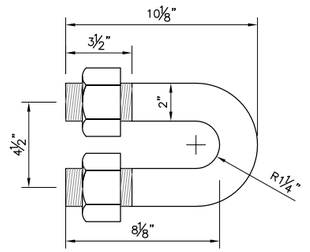
2 / S-5230 DOWN GUY BACKING PLATE (BP1)
SCALE: 1 1/2"=1'-0"
1' 6" 0 1'
SCALE:1-1/2"= 1'-0"



3 / S-5230 DOWN GUY BRACKET (DGB2)
SCALE: 1 1/2"=1'-0"
1' 6" 0 1'
SCALE:1-1/2"= 1'-0"



A / S-5230 SECTION
SCALE: 1 1/2"=1'-0"



4 / S-5230 U-BOLT DETAIL (UB36)
SCALE: 3"=1'-0"
1' 6" 0 1'
SCALE: 3"= 1'-0"

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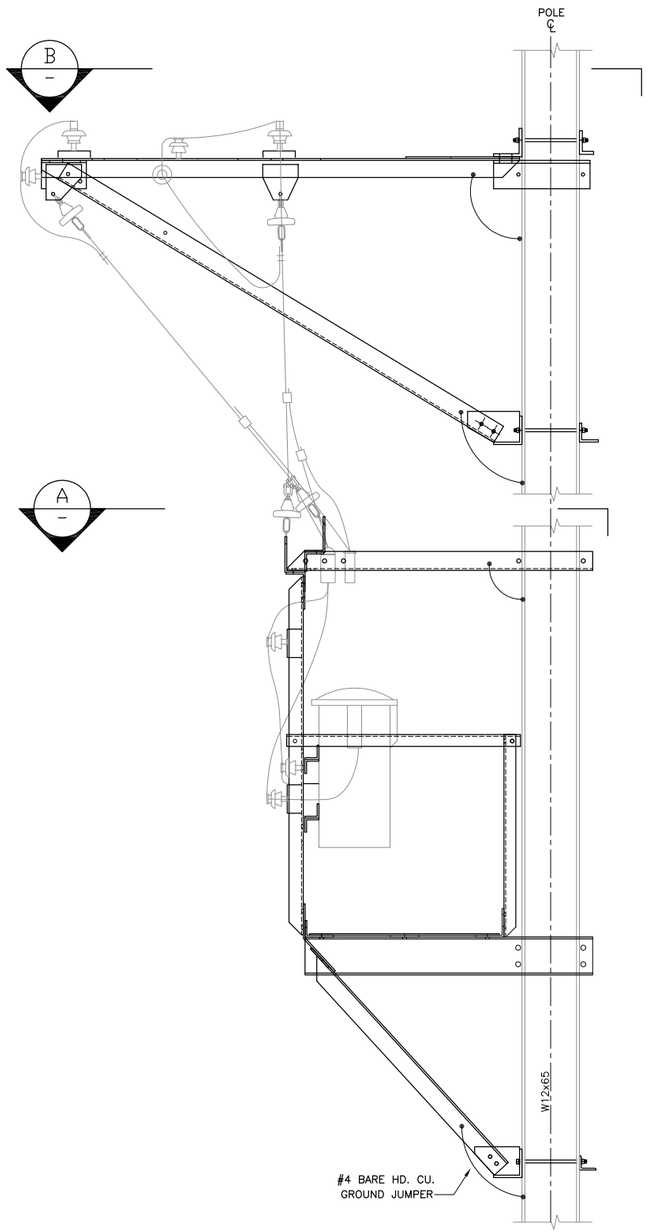
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
DOWNGUY SCHEDULE AND DETAILS

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

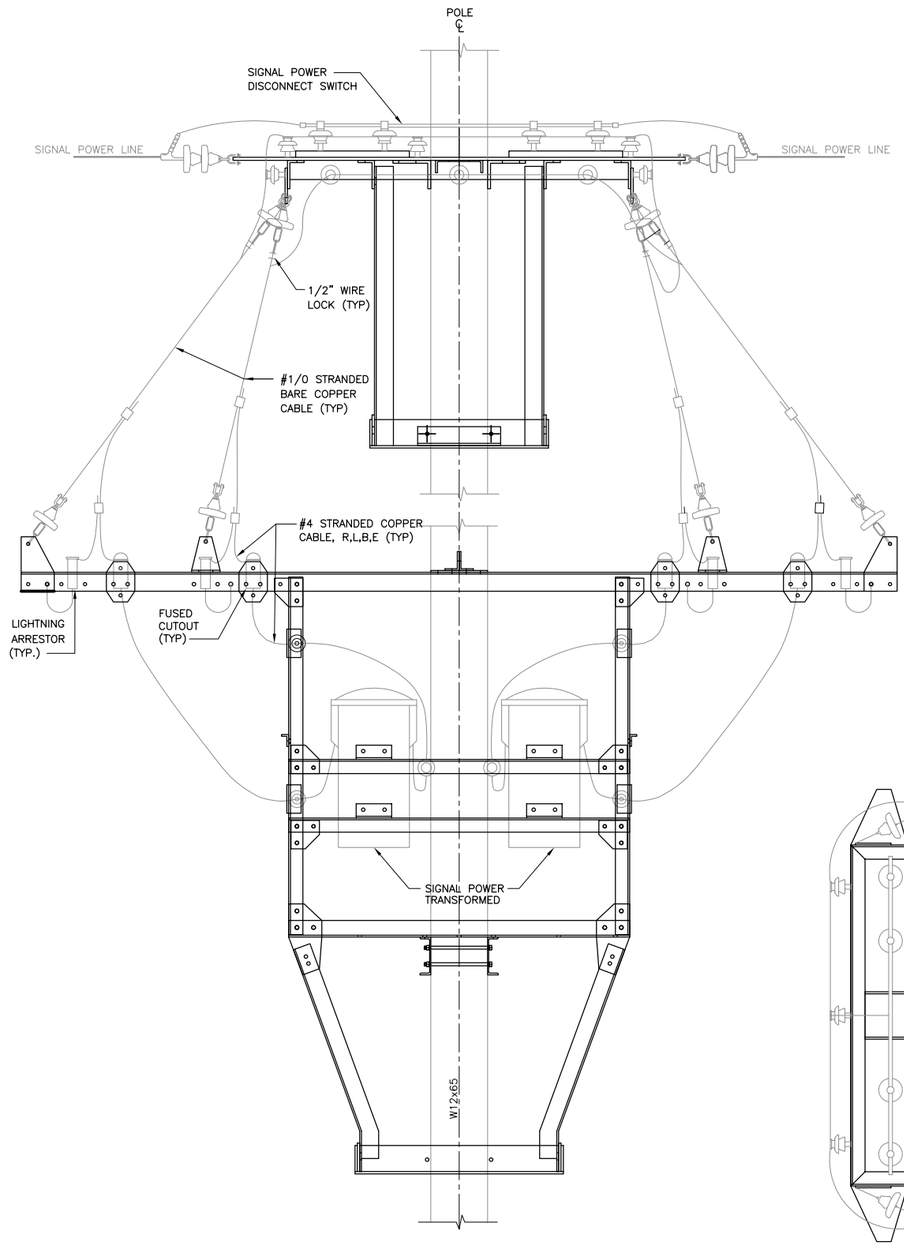
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Ref. No.:	2011-059
Sheet No:	323 OF 347

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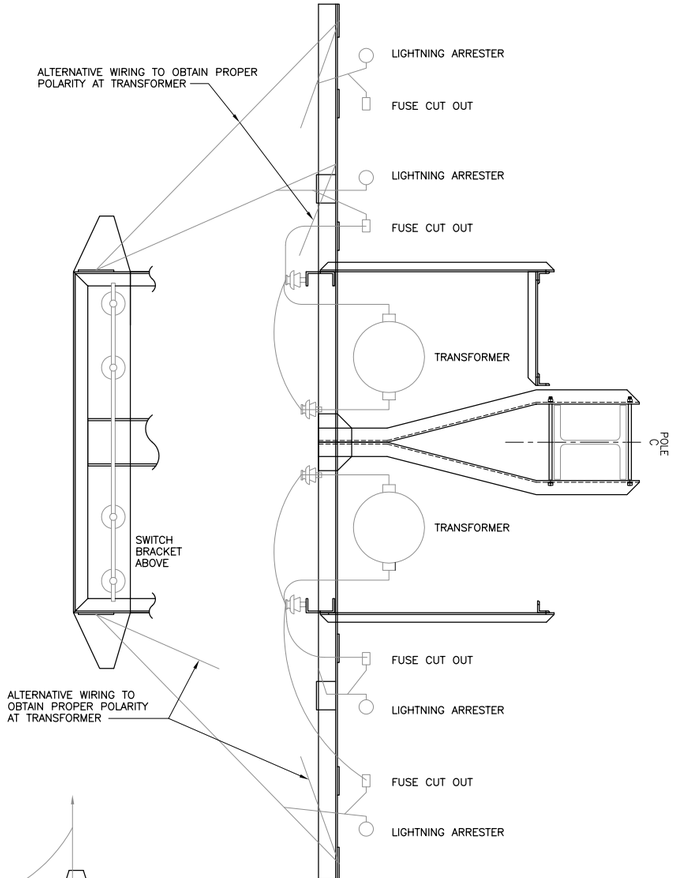
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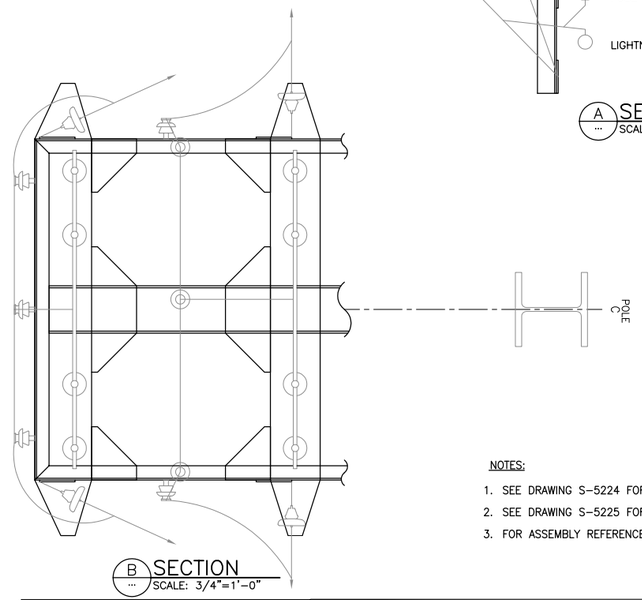
ELEVATION FACING ALONG TRACK
SCALE: 3/4" = 1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4" = 1'-0"



A SECTION
SCALE: 3/4"=1'-0"



B SECTION
SCALE: 3/4"=1'-0"

NOTES:

1. SEE DRAWING S-5224 FOR LADDER DETAILS.
2. SEE DRAWING S-5225 FOR OPERATOR MOUNTING AND ROD SUPPORT.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5236 AND S-5237.

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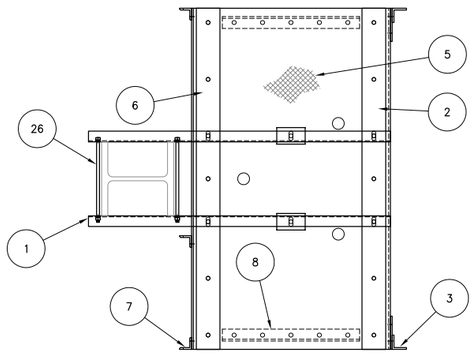
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS - DUAL SWITCH SIGNAL POWER DISCONNECT ARRANGEMENT

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

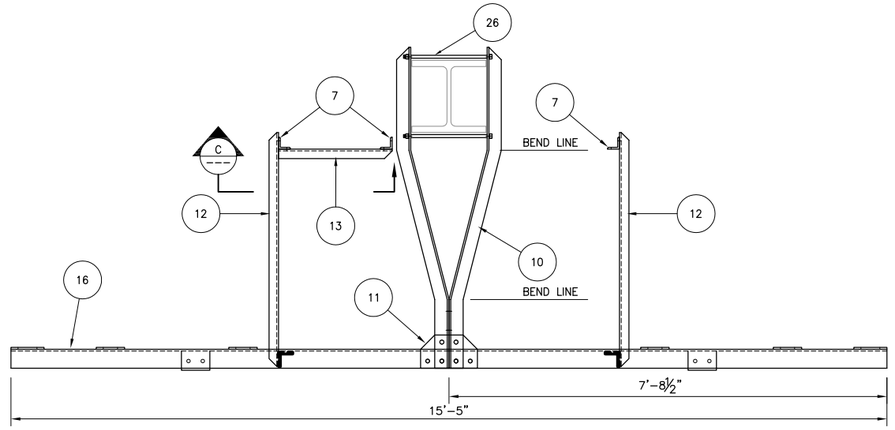
File No.:	2011-059-S-5231.DWG
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Sheet No:	324 OF 347

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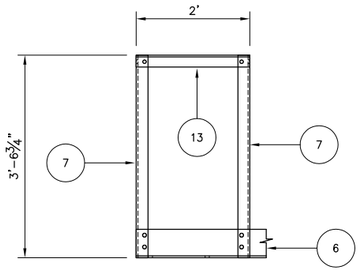
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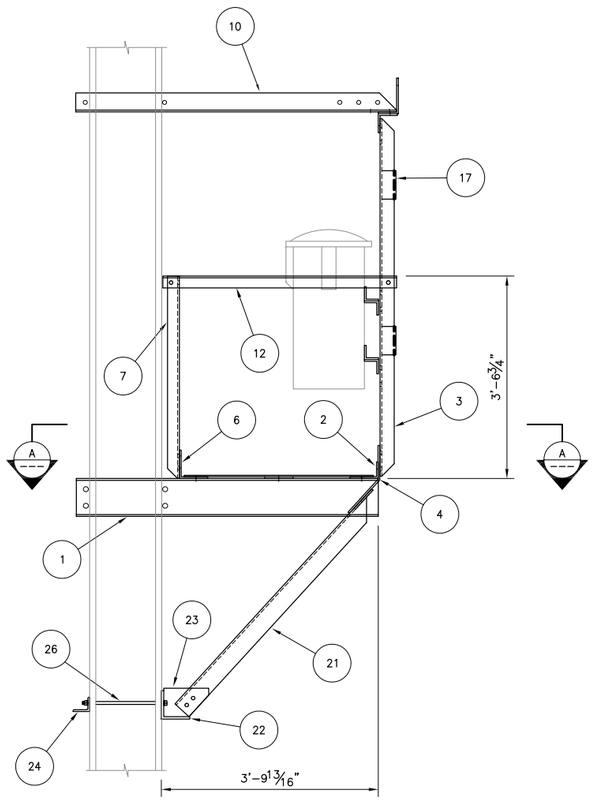
A SECTION
SCALE: 3/4" = 1'-0"



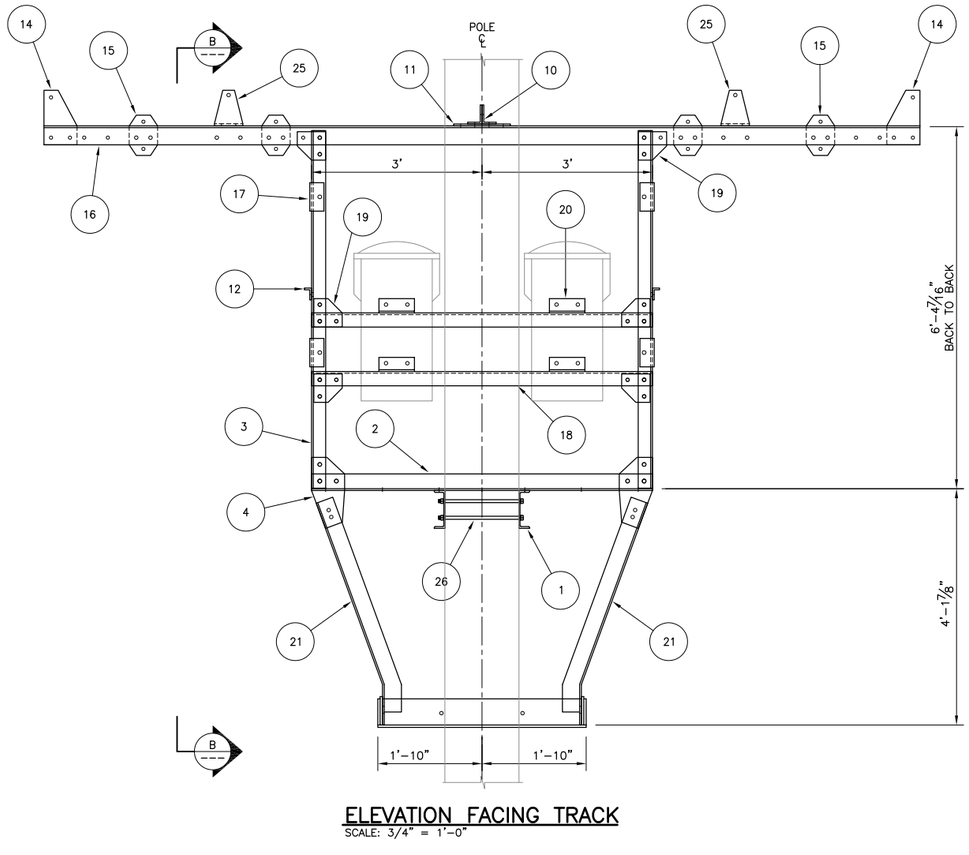
TOP VIEW
SCALE: 3/4" = 1'-0"



C SECTION
SCALE: 3/4" = 1'-0"



B SECTION
SCALE: 3/4" = 1'-0"



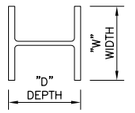
ELEVATION FACING TRACK
SCALE: 3/4" = 1'-0"

BILL OF MATERIAL

ITEM NO.	MARK NUMBER	DESCRIPTION	QTY.
1	019-1/1	C8 x 11.5	2
2	019-1/2	L 6 x 3 1/2 x 3/8 x 6'-0"	1
3	019-1/3	L 3 x 3 x 3/8 x 6'-3 1/2"	2
4	019-1/4	PL 7 x 3/8	2
5	019-1/5	PL 3'-4" x 5/16 x 6'-0" (NON-SKID)	1
6	019-1/6	L 6 x 6 x 3/8 x 6'-0"	1
7	019-1/7	L 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4"	3
8	019-1/8	L 2 1/2 x 2 1/2 x 3/8 x 2'-5" (STIFFENER ANGLE)	2
9	019-1/9	PL 3 1/2 x 3/8 x 0'-6"	2
10	020-1/10	L 4 x 3 x 3/8	2
11	020-1/11	PL 7 x 3/8 x 1'-0"	1
12	020-1/12	L 2 1/2 x 2 x 3/8 x 4'-1 3/8"	2
13	020-1/13	L 2 1/2 x 2 x 3/8 x 2'-0"	1
14	020-1/14	PL 11 1/2 x 3/8 x 0'-7"	2
15	020-1/15	PL 6 x 3/8 x 0'-8 1/2"	4
16	020-1/16	L 4 x 4 x 3/8 x 15'-5"	1
17	019-1/17	L 3 x 3 x 3/8 x 0'-6"	4
18	020-1/18	L 3 x 3 x 3/8 x 6'-0"	2
19	020-1/19	PL 6 x 3/8 x 0'-6"	6
20	020-1/20	L 3 x 3 x 3/8 x 0'-8 1/2"	4
21	020-1/21	L 4 x 4 x 3/8	2
22	012-1/22	L 6 x 6 x 1/2 x 3'-8"	1
23	020-1/23	PL 6 x 1/2 x 0'-9 1/2"	2
24	020-1/24	L 3 1/2 x 3 x 3/8 x 1'-10"	1
25	020-1/25	L 8 x 4 x 1/2 x 0'-6"	2
26	-----	CLAMPING BOLT 1"ø A325/NUTS & LOCK WASHERS	8
27	-----	LADDER	1

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5231.
2. FOR POLE SIZE, POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5233 AND S-5234.
4. STEEL TO BE ASTM A-36 AND GALVANIZED IN ACCORDANCE WITH ASTM A-123.
5. STEEL FABRICATION SHALL COMPLY TO AISC STEEL CONSTRUCTION MANUAL LATEST EDITION.



"X" = "D" + 1 1/2"

"Y" = "W" + 1 1/2"

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BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

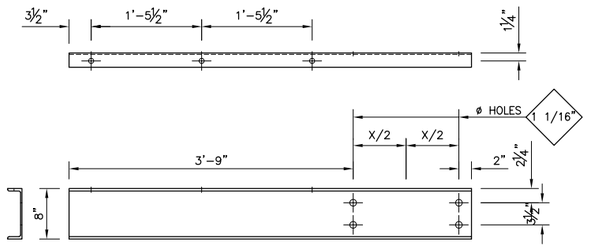
STRUCTURAL - TYPICAL DETAILS - SIGNAL POWER TRANSFORMERS PLATFORM

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

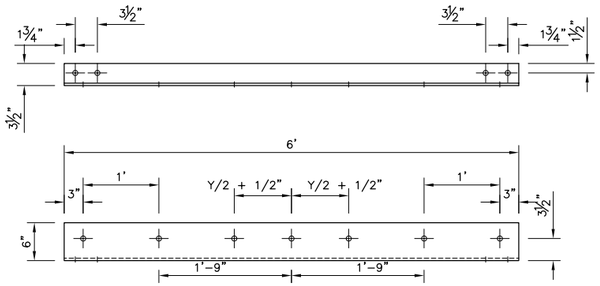
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Ref. No.:	2011-059
Sheet No:	325 OF 347

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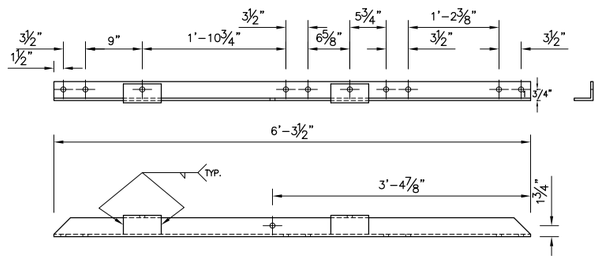
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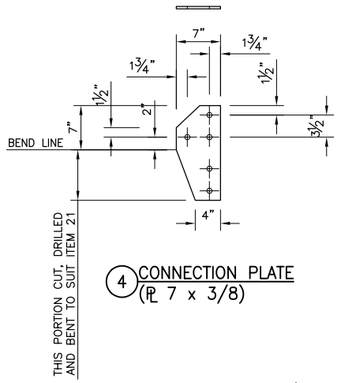
1 PLATFORM SUPPORT CHANNEL
(C 8 x 11.5)



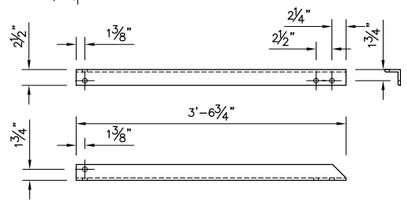
2 PLATFORM SUPPORT ANGLE
(L 6 x 3 1/2 x 3/8 x 6'-0")



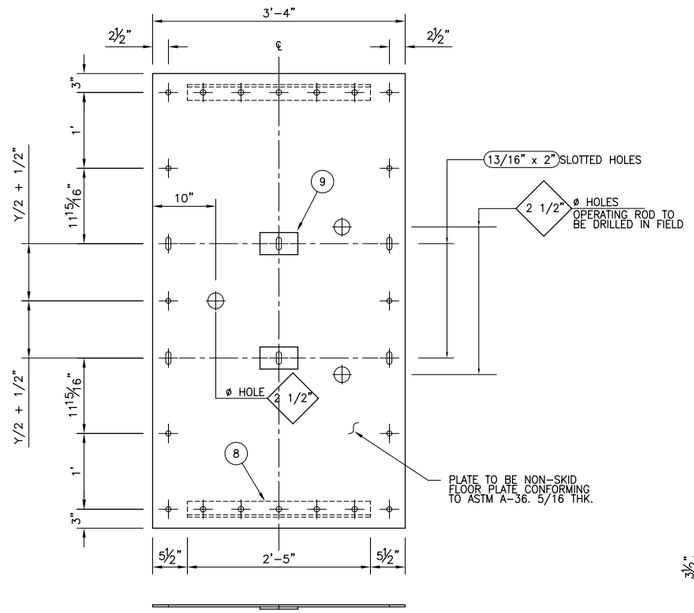
3 CROSS ARM SUPPORT ANGLE & ITEM 17
(L 3 x 3 x 3/8 x 6'-3 1/2")



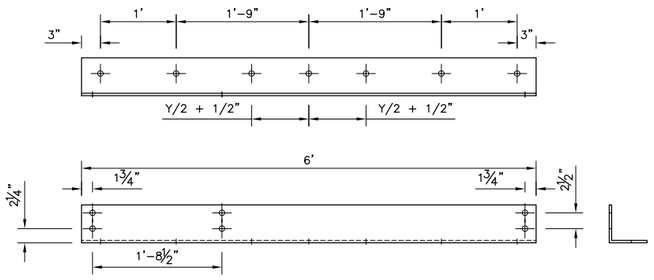
4 CONNECTION PLATE
(PL 7 x 3/8)



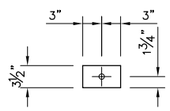
7 HANDRAIL SUPPORT ANGLE
(L 2 1/2 x 2 1/2 x 3/8 x 3'-6 3/4")



5 NON-SKID PLATE & ITEM 8
(PL 3'-4 x 5/16 x 6'-0")



6 PLATE SUPPORT ANGLE
(L 6 x 6 x 3/8 x 6'-0")



9 FILLER PLATE
(PL 3 1/2 x 3/8 x 0-6")

NOTES:

1. BOLT HOLES TO BE 13/16" ø, UNLESS OTHERWISE NOTED.

3/14/2016 4:19:09 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5233.dwg

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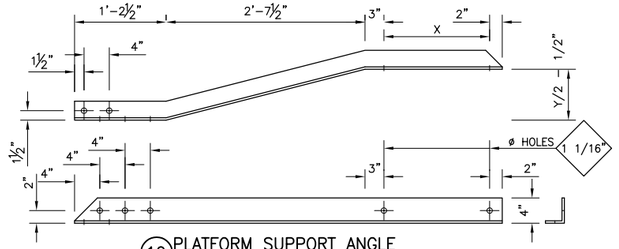
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL DETAILS – TRANSFORMER PLATFORM ASSEMBLY DETAILS (SHEET 1 OF 2)

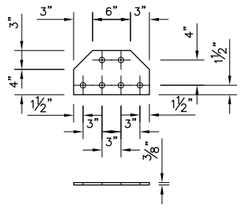
Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

File No.:	2011-059-S-5233.DWG
Ref. No.:	2011-059
Sheet No:	326 OF 347

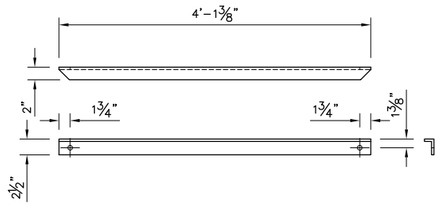
S–5233



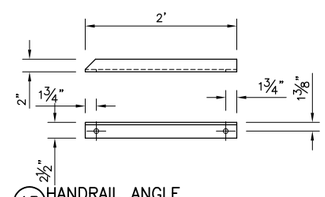
(10) PLATFORM SUPPORT ANGLE
(L 4 x 3 x 3/8)



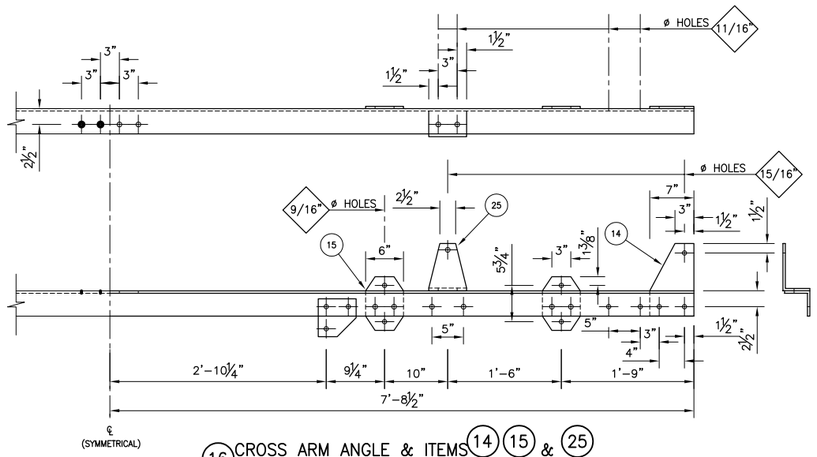
(11) CONNECTION PLATE
(PL 7 x 3/8 x 1'-0")



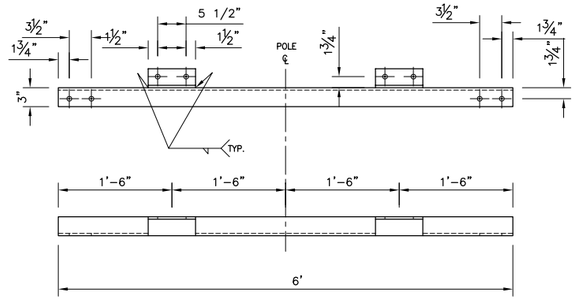
(12) HANDRAIL ANGLE
(L 2 1/2 x 2 x 3/8 x 4'-1 3/8")



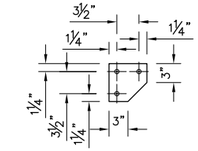
(13) HANDRAIL ANGLE
(L 2 1/2 x 2 x 3/8 x 2'-0")



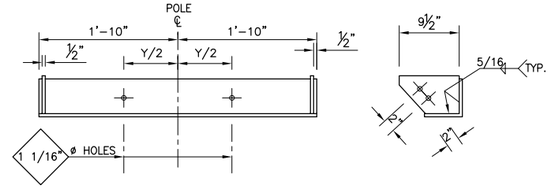
(16) CROSS ARM ANGLE & ITEMS (14) (15) & (25)
(L 4 x 4 x 3/8 x 15'-5")



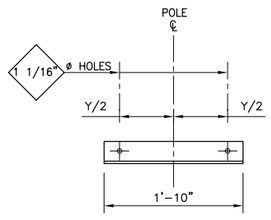
(18) TRANSFORMER SUPPORT ANGLE & ITEM (20)
(L 3 x 3 x 3/8 x 6'-0")



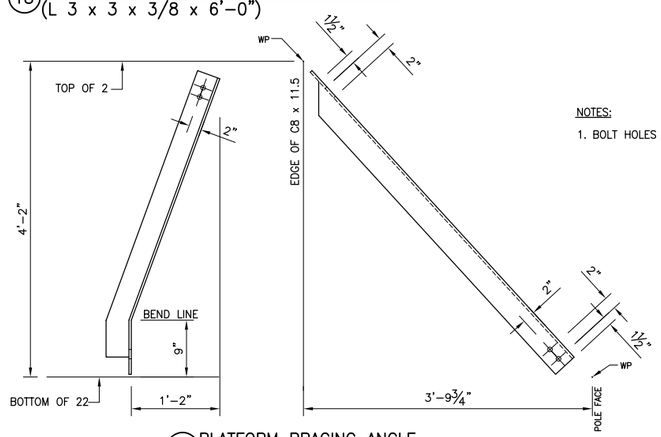
(19) CONNECTION PLATE
(PL 6 x 3/8 x 6)



(22) CLAMP ANGLE & ITEM (23)
(L 6 x 6 x 1/2 x 3'-8")



(24) CLAMP ANGLE
(L 3 1/2 x 3 x 3/8 x 1'-10")



(21) PLATFORM BRACING ANGLE
(L 4 x 4 x 3/8)

NOTES:

1. BOLT HOLES TO BE 13/16" ø, UNLESS OTHERWISE NOTED.

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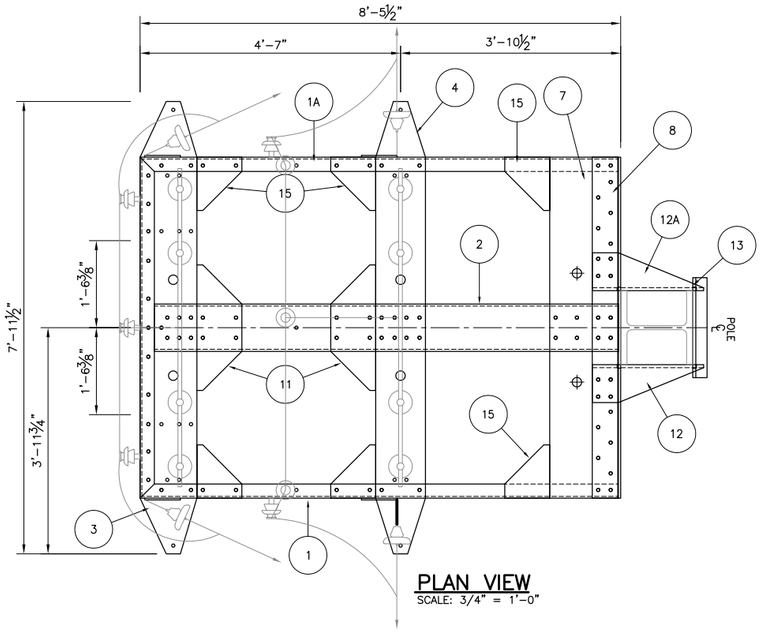
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL – TYPICAL DETAILS – TRANSFORMER PLATFORM ASSEMBLY DETAILS (SHEET 2 OF 2)

Recommended: DP | Drawn: SZM | Checked: MJM | Date: 03/17/16

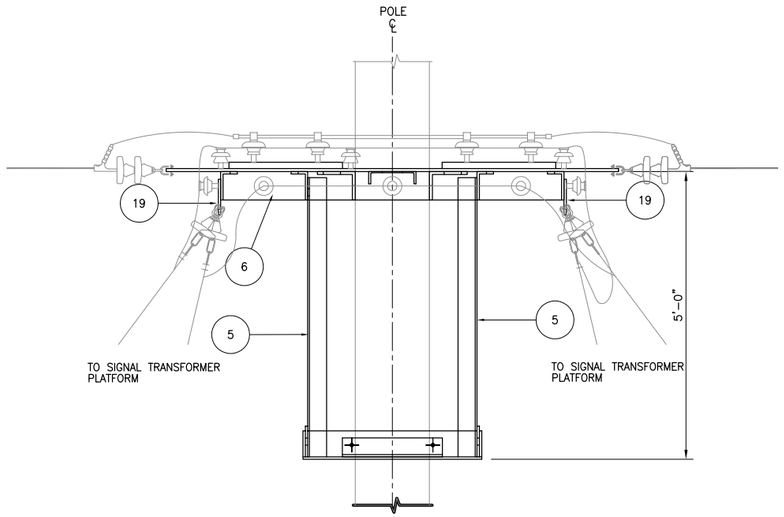
File No.:	2011-059-S-5234.DWG
Ref. No.:	2011–059
Sheet No:	327 OF 347

S–5234

4:19:14 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5234.dwg



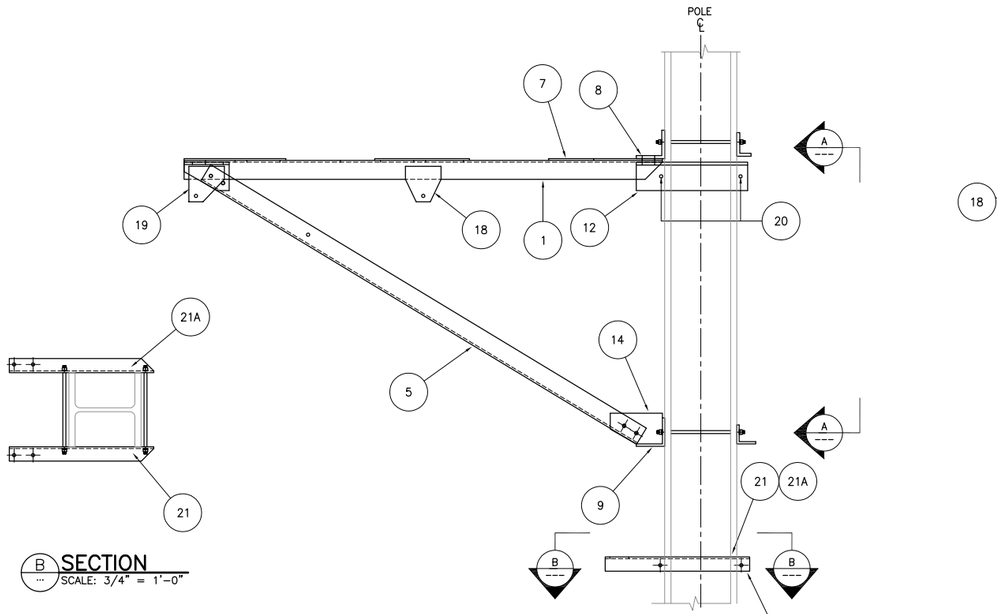
PLAN VIEW
SCALE: 3/4" = 1'-0"



ELEVATION FACING ACROSS TRACK
SCALE: 3/4" = 1'-0"

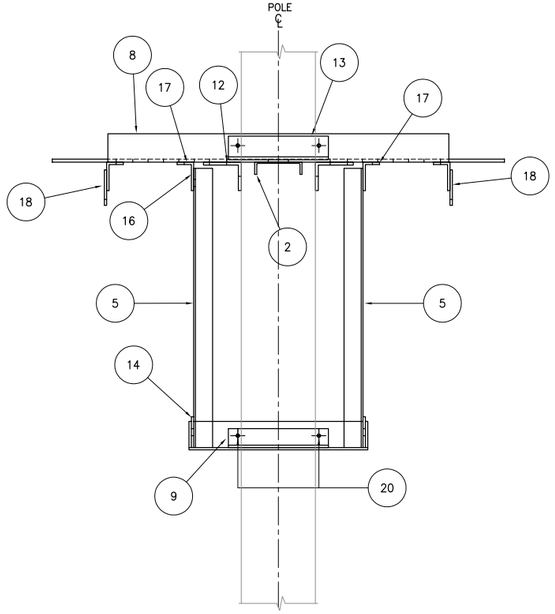
BILL OF MATERIAL

ITEM	MARK	DESCRIPTION	QTY
1	022-1/1	L 4 x 3 x 3/8 x 8'-5"	1
2	023-1/2	C 10 x 15.3 x 8'-2"	1
3	023-1/3	PL 12 x 3/8 x 7'-11 1/2"	1
4	023-1/4	PL 10 1/2 x 3/8 x 7'-11 1/2"	1
5	015-1/5	L 4 x 4 x 3/8 x 8'-11 1/2"	1
6	022-1/6	L 5 x 3 x 3/8 x 6'-0"	1
7	022-1/7-Y	PL 14 1/2 x 3/8 x 6'-0"	1
8	022-1/8-Y	L 6 x 6 x 5/8 x 6'-0"	1
9	022-1/9-Y	L 6 x 6 x 1/2 x 3'-2"	1
10	022-1/10-Y	L 4 x 4 x 1/2 x 1'-5 1/2"	1
11	023-1/11	PL 9 1/2 x 3/8 x 2'-3"	2
12	023-1/12-X	L 8 x 6 x 5/8 x 1'-8 3/8"	1
13	023-1/13-Y	L 5 x 3 1/2 x 5/8 x 1'-5 1/2"	1
14	022-1/14	PL 11 x 6 1/2 x 1/2	2
15	022-1/15	PL 9 1/2 x 3/8 x 11 1/4	6
16	022-1/16	L 6 x 3 1/2 x 1/2 x 9 1/2	1
17	023-1/17	PL 3 1/2 x 3/8 x 8 3/4	2
18	022-1/18	PL 7 1/2 x 7 1/2 x 1/2	2
19	022-1/19	PL 7 1/2 x 7 1/2 x 1/2	2
20	-----	CLAMPING BOLT 1"ø, 18" LONG 4" THREAD	6
		WITH NUTS AND WASHERS	--
12A	023-1/1	L 8 x 6 x 5/8 x 1'-8 3/8"	1
--	-----	-------	--
16A	023-1/1	PL 6 x 3 1/2 x 1/2 x 9 1/2	1
1A	022-1/1	L 4 x 3 x 3/8 x 8'-5"	1
5A	023-1/1	L 4 x 4 x 3/8 x 8'-11 1/2"	1
–	-----	3/4" ø BOLTS 2 1/4" LG. W/ NUTS & WASHERS	90
21&21A	023-1/1	ANGLES, 1 SET, 3 x 3 x 3/8 x 2'-6 1/2"	4
22	-----	CLAMPING BOLT 3/4"ø, 18" LONG 4" THREAD	8
		WITH NUTS AND LOCK WASHERS	

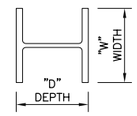


ELEVATION FACING ALONG TRACK
SCALE: 3/4" = 1'-0"

B SECTION
SCALE: 3/4" = 1'-0"



A SECTION
SCALE: 3/4" = 1'-0"



"X" = "D" + 1 1/2"

"Y" = "W" + 1 1/2"

NOTES:

1. FOR GENERAL ARRANGEMENT OF SIGNAL DISCONNECT SWITCH PLATFORM, SEE DRAWING S-5231.
2. FOR POLE SIZE, SEE POLE SCHEDULE IN STRUCTURAL DRAWINGS.
3. FOR ASSEMBLY REFERENCE SEE DRAWINGS S-5236 AND S-5237.

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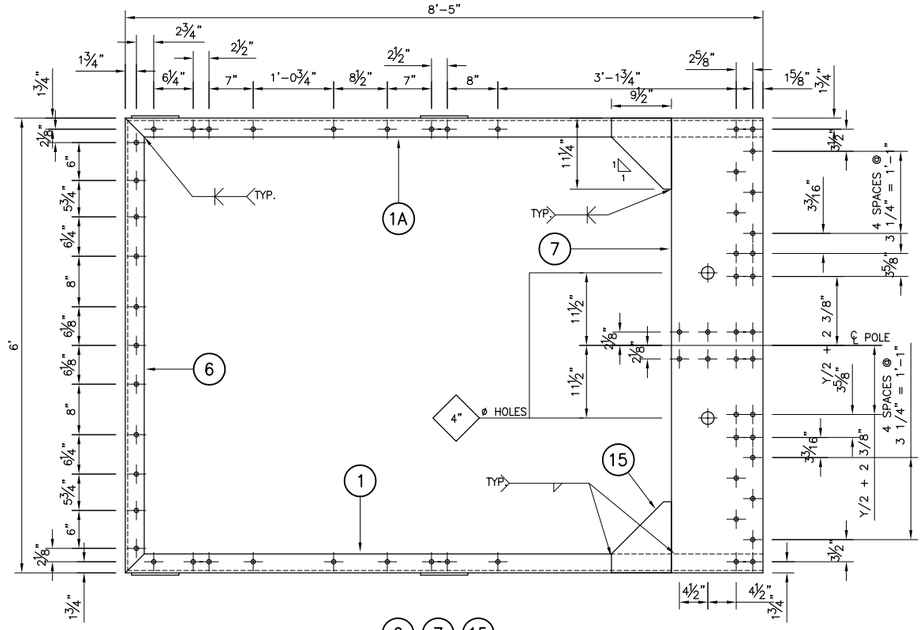
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL - TYPICAL DETAILS
SIGNAL POWER DISCONNECT SWITCH PLATFORM

Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

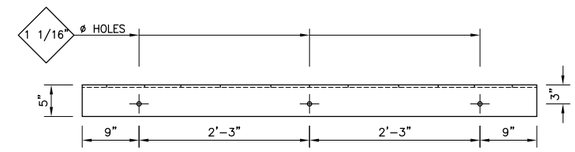
File No.:	2011-059-S-5235.DWG
Ref. No.:	2011-059
Sheet No:	328 OF 347

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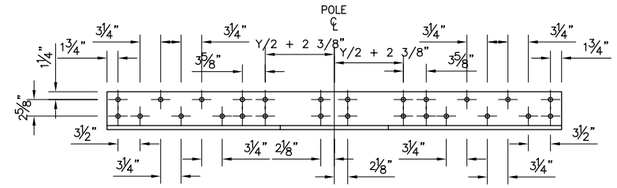
4:19:18 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5235.dwg

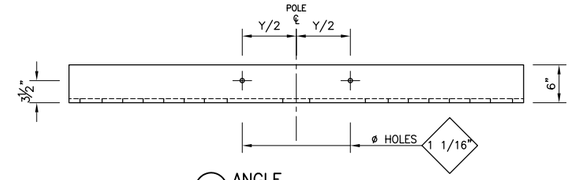


1 1A ANGLE AND ITEMS 6 7 15
(4 x 3 x 3/8 x 8'–5")

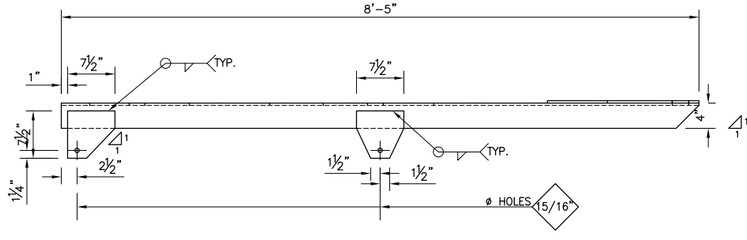


6 ANGLE
(5 x 3 x 3/8 x 6'–0")

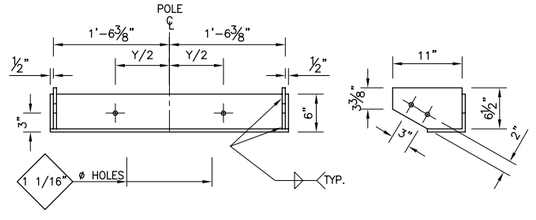




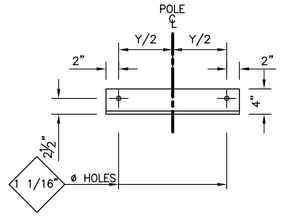
8 ANGLE
(6 x 6 x 5/8 x 6'–0")



1 ANGLE AND ITEMS 18 19
(4 x 3 x 3/8 x 8'–5")
1A AS DRAWN OPPOSITE HAND



9 ANGLE AND ITEM 14
(6 x 6 x 1/2 x 3'–2")



10 ANGLE
(4 x 4 x 1/2 x 1'–5 1/2")

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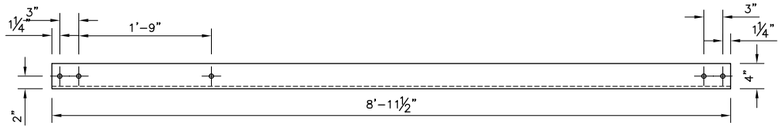
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION

STRUCTURAL – TYPICAL DETAILS – DISCONNECT SWITCH PLATFORM ASSEMBLY DETAILS (SHEET 1 OF 2)

Recommended:	Drawn:	Checked:	Date:
DP	SZM	MJM	03/17/16

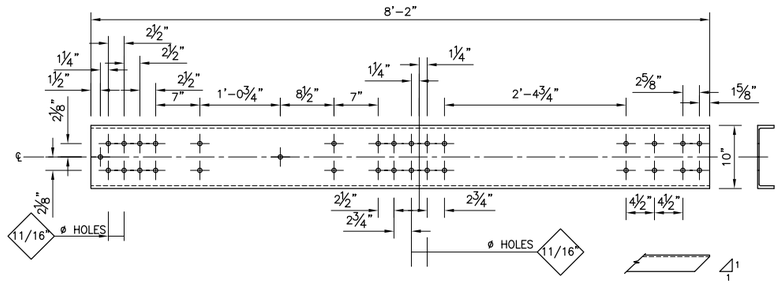
File No.:	2011-059-S-5236.DWG
Ref. No.:	2011–059
Sheet No:	329 OF 347

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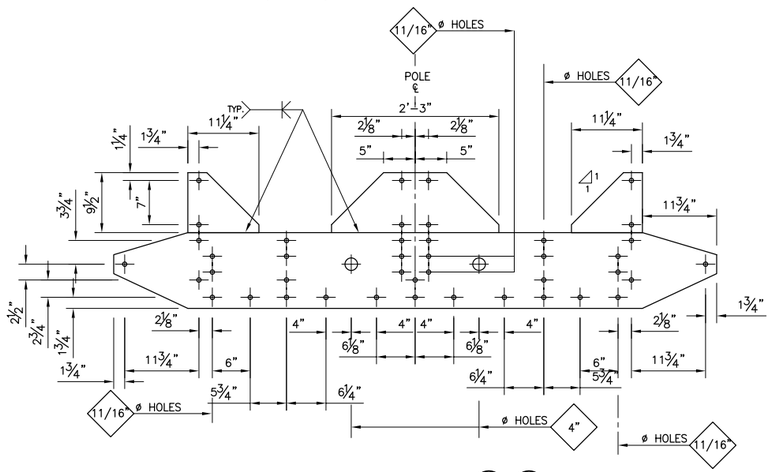


5 ANGLE
(4 x 4 x 3/8 x 8'-11 1/2")

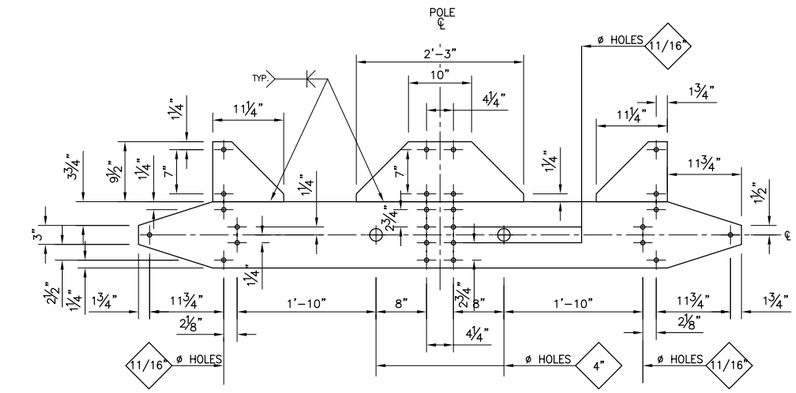
5A AS DRAWN OPPOSITE HAND



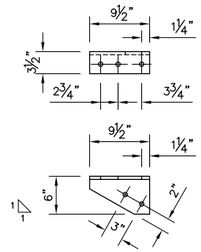
2 CHANNEL
(C 10x15.3)



3 PLATE AND ITEMS (11) (15)
(1'-0" x 3/8 x 7'-11 1/2")

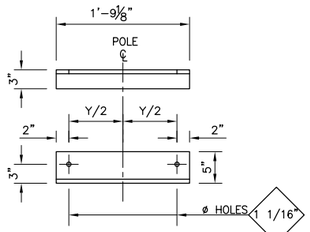


4 PLATE AND ITEMS (11) (15)
(10 1/2 x 3/8 x 7'-11 1/2")

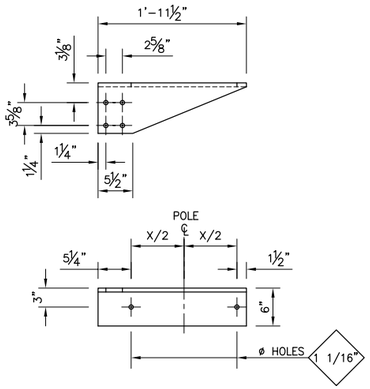


16 ANGLE
(6 x 3 1/2 x 1/2 x 9 1/2)

16A AS DRAWN OPPOSITE HAND

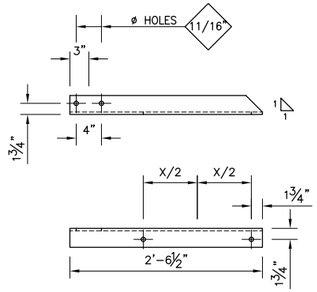


13 ANGLE
(5 x 3 1/2 x 5/8)



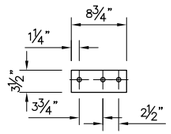
12 ANGLE
(8 x 6 x 5/8)

12A AS DRAWN OPPOSITE HAND



21 OPERATING ROD SUPPORT ANGLE
(3 x 3 x 3/8 x 2'-6 1/2")

21A AS DRAWN OPPOSITE HAND



17 FILLER PLATE
(3 1/2 x 3/8 x 8 3/4)

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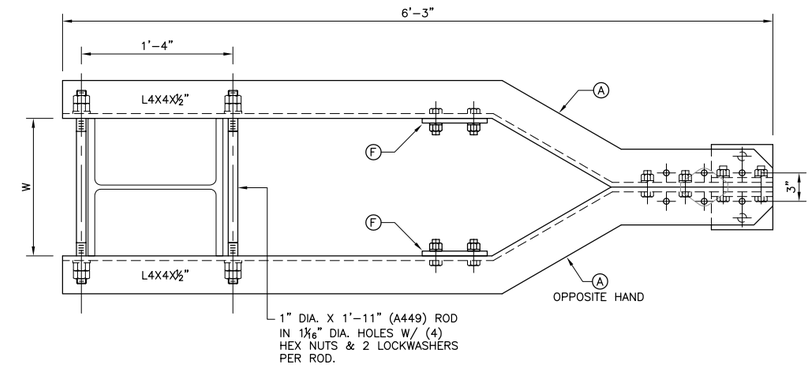
STRUCTURAL – TYPICAL DETAILS – DISCONNECT SWITCH PLATFORM ASSEMBLY DETAILS (SHEET 2 OF 2)

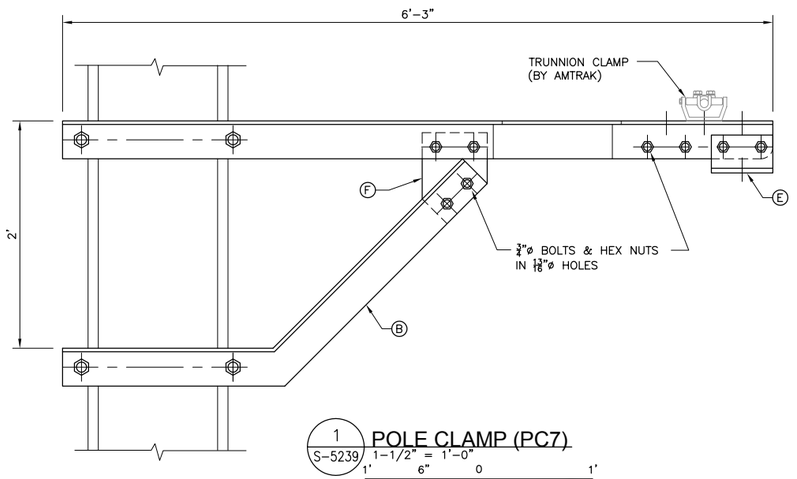
Recommended:	DP	Drawn:	SZM	Checked:	MJM	Date:	03/17/16

File No.:	2011-059-S-5237.DWG
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Sheet No:	330 OF 347

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TABLE OF PC7	
POLE SIZE	W
W14X90	14.52"
W14x120	14.67"
W14x145	15.50"

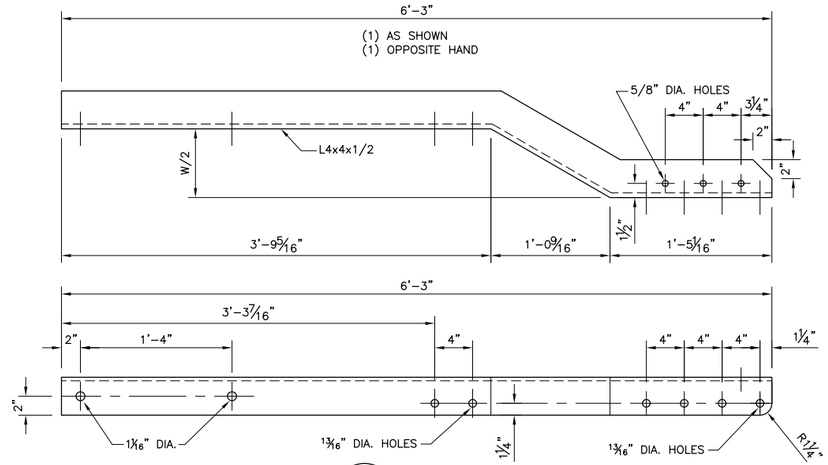




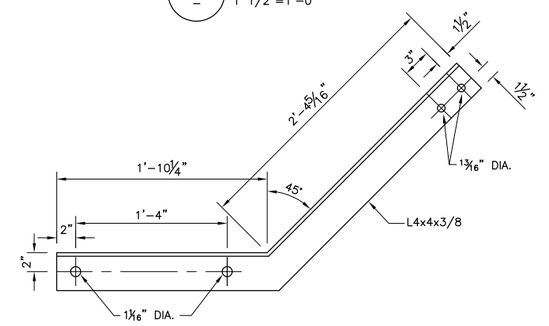
1 S-5239 POLE CLAMP (PC7)
1-1/2" = 1'-0"

1' 6" 0 1'

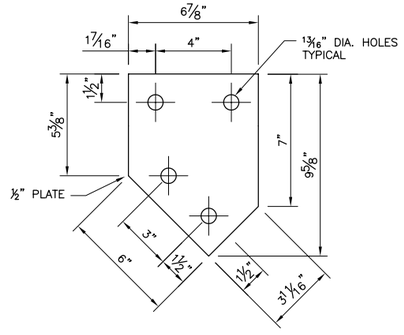
SCALE:1-1/2"= 1'-0"



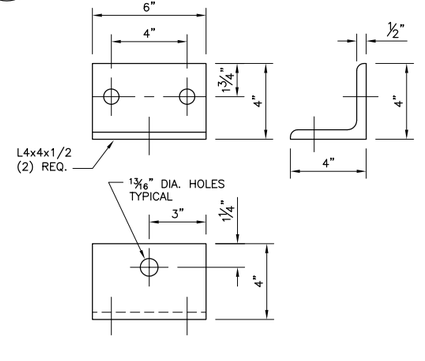
A – DETAIL A
1 1/2"=1'-0"



B – DETAIL B
1 1/2"=1'-0"



C – DETAIL F
3"=1'-0"



D – DETAIL E
3"=1'-0"

1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

1' 6" 0 1'

SCALE: 3"= 1'-0"

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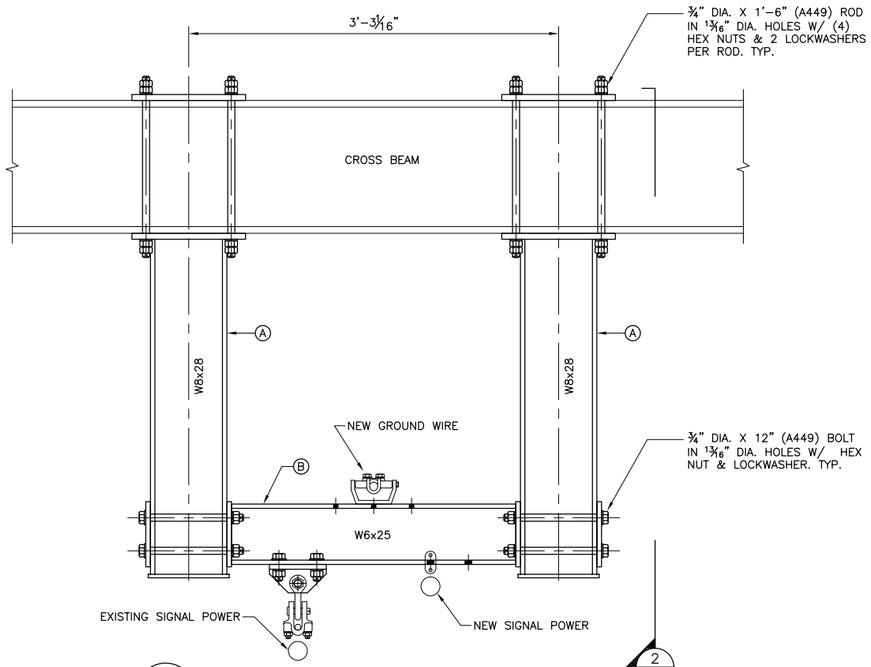
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
SIGNAL POWER BRACKETS

File No.:	2011-059-S-5239.DWG
Ref. No.:	2011-059
Sheet No:	331 OF 347

S-5239

Recommended: RSW	Drawn: VJC	Checked: RSW	Date: 03/17/16

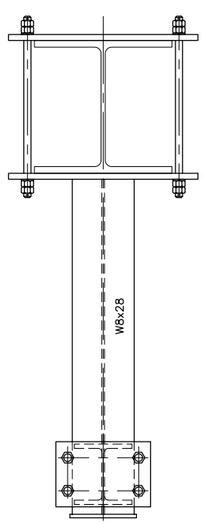
J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5239.dwg
3/14/2016 4:19:32 PM



1 S-5240 **UNDER BRIDGE SIGNAL POWER (UBSP)**

1' 6" 0 1'

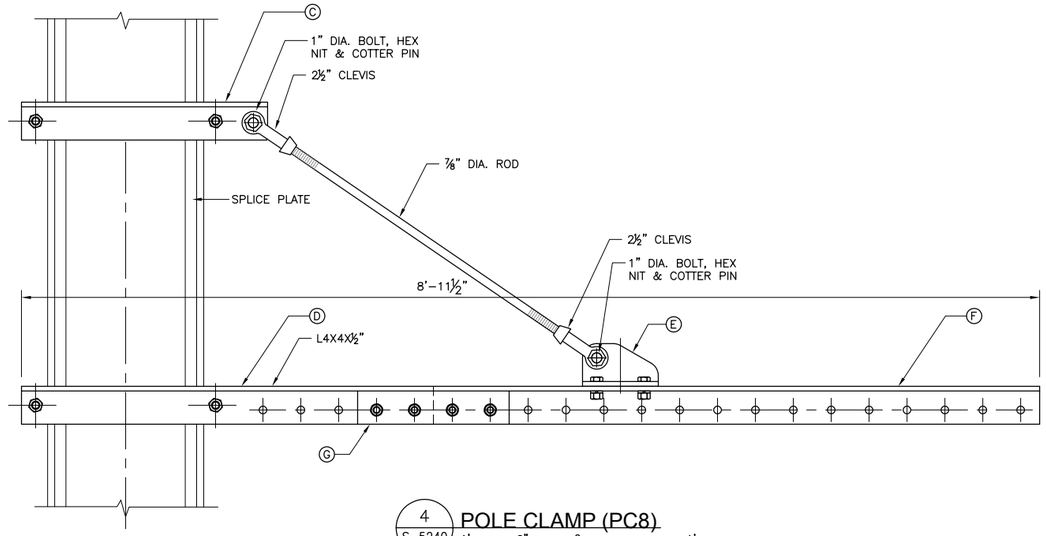
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2 S-5240 **ELEVATION**

1' 6" 0 1'

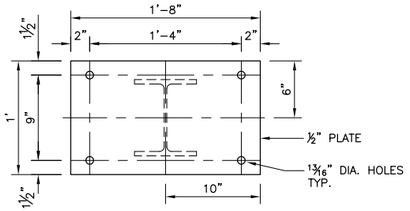
SCALE:1-1/2"= 1'-0"

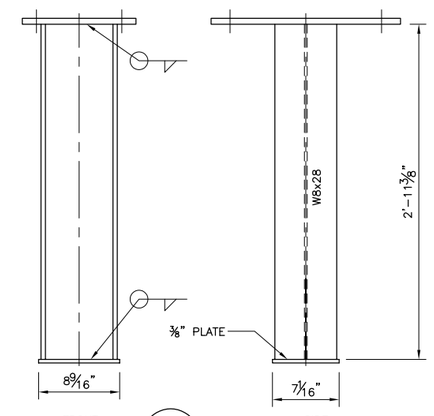


4 S-5240 **POLE CLAMP (PC8)**

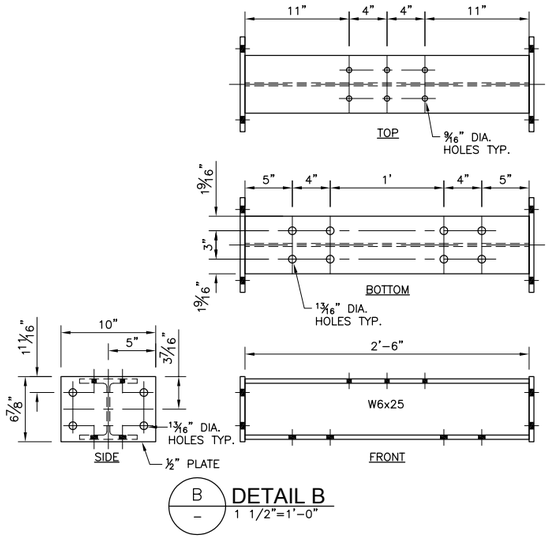
1' 6" 0 1'

SCALE:1-1/2"= 1'-0"

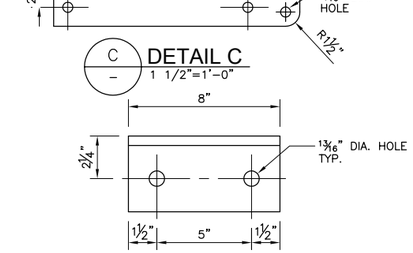




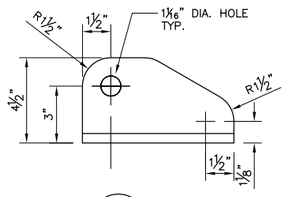
A 1 1/2"=1'-0" **DETAIL A**



B 1 1/2"=1'-0" **DETAIL B**



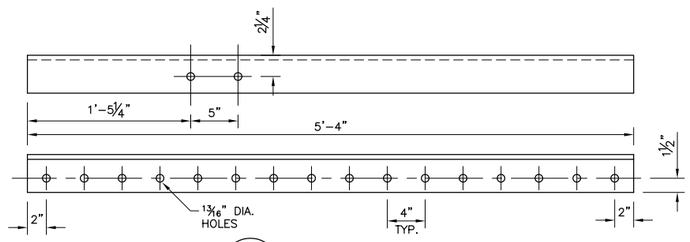
C 1 1/2"=1'-0" **DETAIL C**



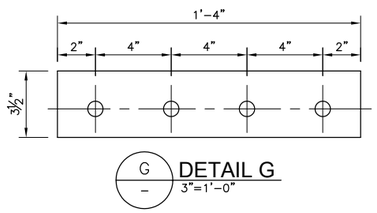
E 3"=1'-0" **DETAIL E**



D 1 1/2"=1'-0" **DETAIL D**



F 1 1/2"=1'-0" **DETAIL F**



G 3"=1'-0" **DETAIL G**

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National Railroad Passenger Corporation
30TH Street Station–Philadelphia, Pennsylvania 19104

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BURNS ENGINEERING, INC. | 215 979-7700
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PHILADELPHIA, PA 19103

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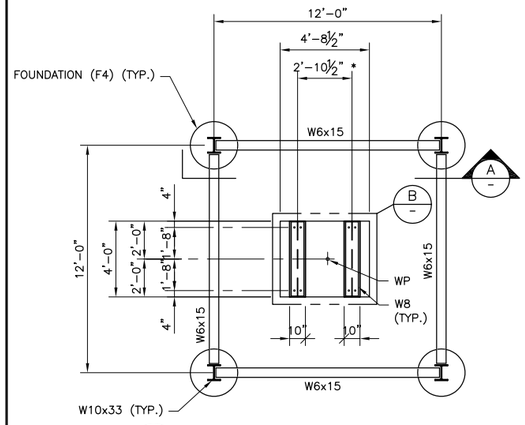
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL
UNDER BRIDGE SIGNAL POWER (UBSP)

Recommended: RSW | Drawn: VJC | Checked: RSW | Date: 03/17/16

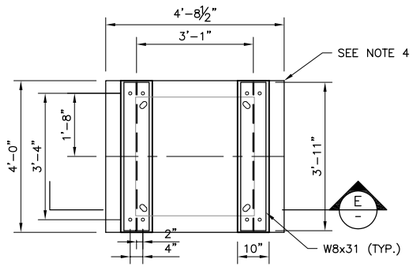
File No.:	2011-059-S-5240.DWG
Ref. No.:	2011-059
Sheet No:	332 OF 347

S-5240

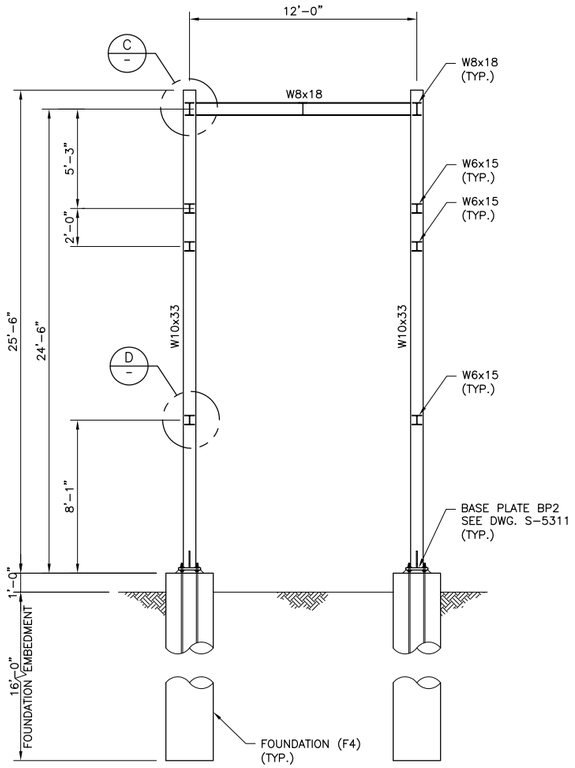
3/14/2016 4:19:37 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5240.dwg



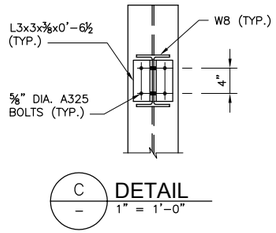
1 / S-5501 **352 BREAKER FRAMING PLAN**
1/4" = 1'-0"



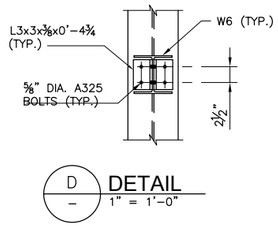
B / – **352 BREAKER FOUNDATION PLAN**
1/2" = 1'-0"



A / – **SECTION**
1/4" = 1'-0"



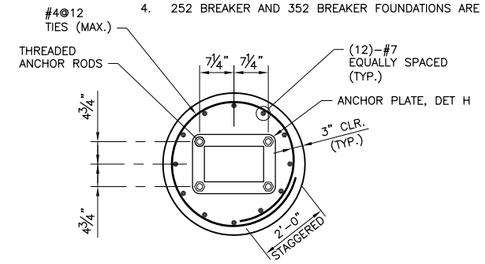
C / – **DETAIL**
1" = 1'-0"



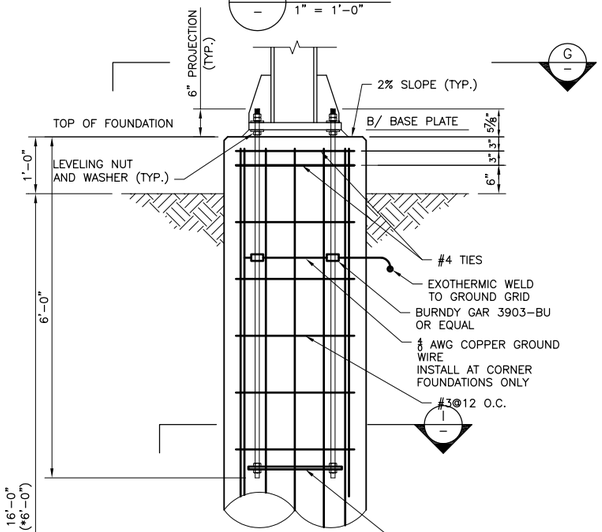
D / – **DETAIL**
1" = 1'-0"

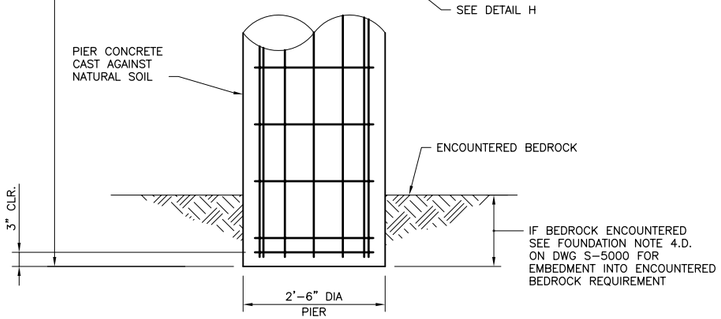
NOTES:

1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.
3. * MAY VARY PER EQUIPMENT MANUFACTURER REQUIREMENTS.
4. 252 BREAKER AND 352 BREAKER FOUNDATIONS ARE IDENTICAL.



I / – **DETAIL**
1" = 1'-0"

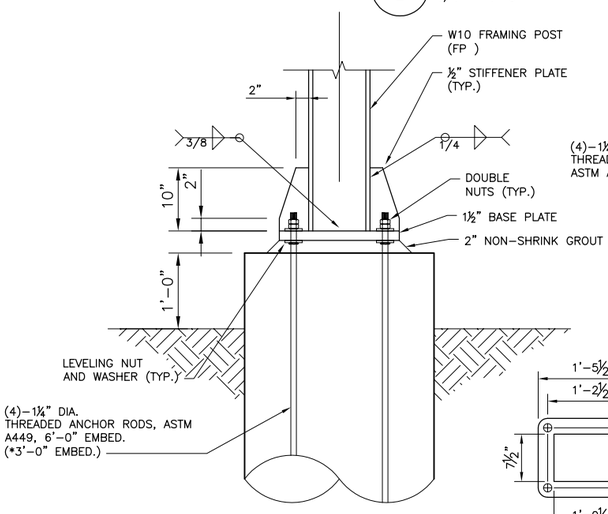




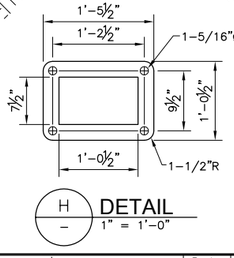
2 / – **FOUNDATION DETAIL (F4)**
3/4" = 1'-0"



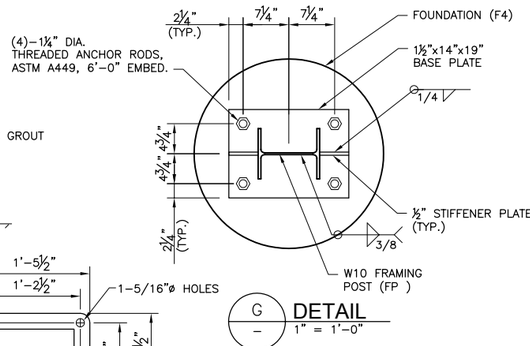
E / – **SECTION**
1/2" = 1'-0"



F / – **DETAIL**
1" = 1'-0"



H / – **DETAIL**
1" = 1'-0"



G / – **DETAIL**
1" = 1'-0"

SCALE:3/4"=1'-0" SCALE:1/4"= 1'-0" SCALE: 1"=1'-0"

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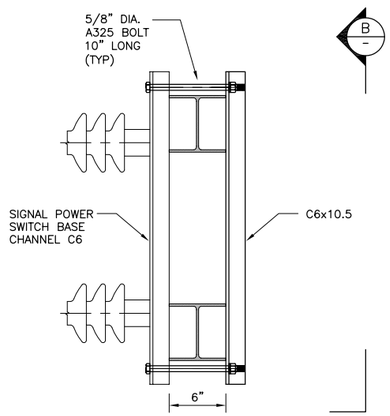
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL STEEL – 352 BREAKER INSTALLATION PLANS, SECTIONS AND DETAILS

Recommended: AJT	Drawn: TAB	Checked: MJM	Date: 03/17/16

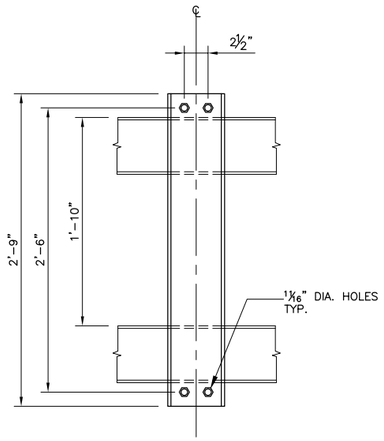
File No.:	2011-059-S-5501.DWG
Ref. No.:	2011-059
Sheet No:	333 OF 347

S-5501

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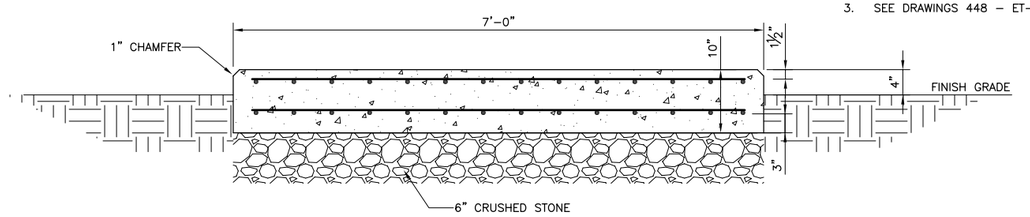
A — SWITCH MOUNTING PLATE
1 1/2" = 1'-0"



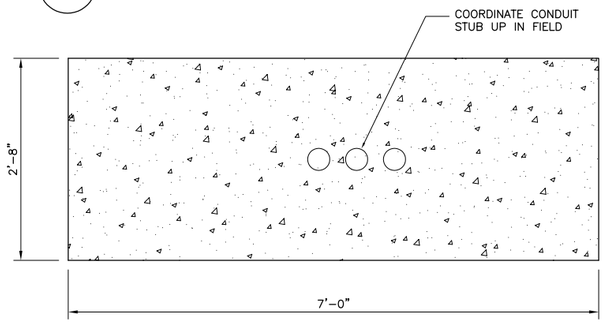
B — SECTION
1 1/2" = 1'-0"

NOTES:

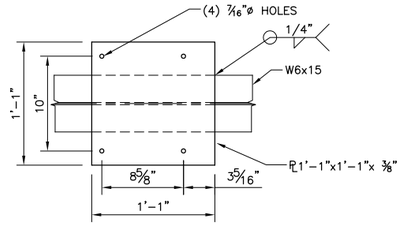
1. FOR GENERAL STRUCTURAL NOTES AND ABBREVIATIONS SEE DWG S-5000.
2. FOR TYPICAL STRUCTURAL DETAILS, SEE DWG S-5001.
3. SEE DRAWINGS 448 – ET-3211 AND 449 – ET-3212 FOR EQUIPMENT LOCATIONS.



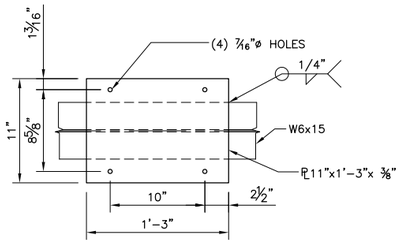
G — SIGNAL POWER CABINET FOUNDATION - SECTION
1" = 1'-0"



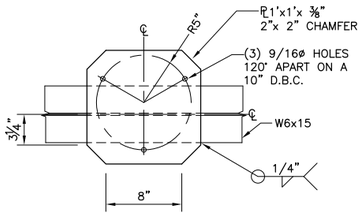
H — SIGNAL POWER CABINET FOUNDATION - PLAN
1" = 1'-0"



C — CURRENT TRANSFORMER MOUNTING PLATE
1 1/2" = 1'-0"



D — POTENTIAL TRANSFORMER MOUNTING PLATE
1 1/2" = 1'-0"



E — LIGHTNING ARRESTER MOUNTING PLATE
1 1/2" = 1'-0"

1' 6" 0 1'
SCALE:1-1/2"= 1'-0"

1' 0 1' 2'
SCALE: 1"=1'-0"

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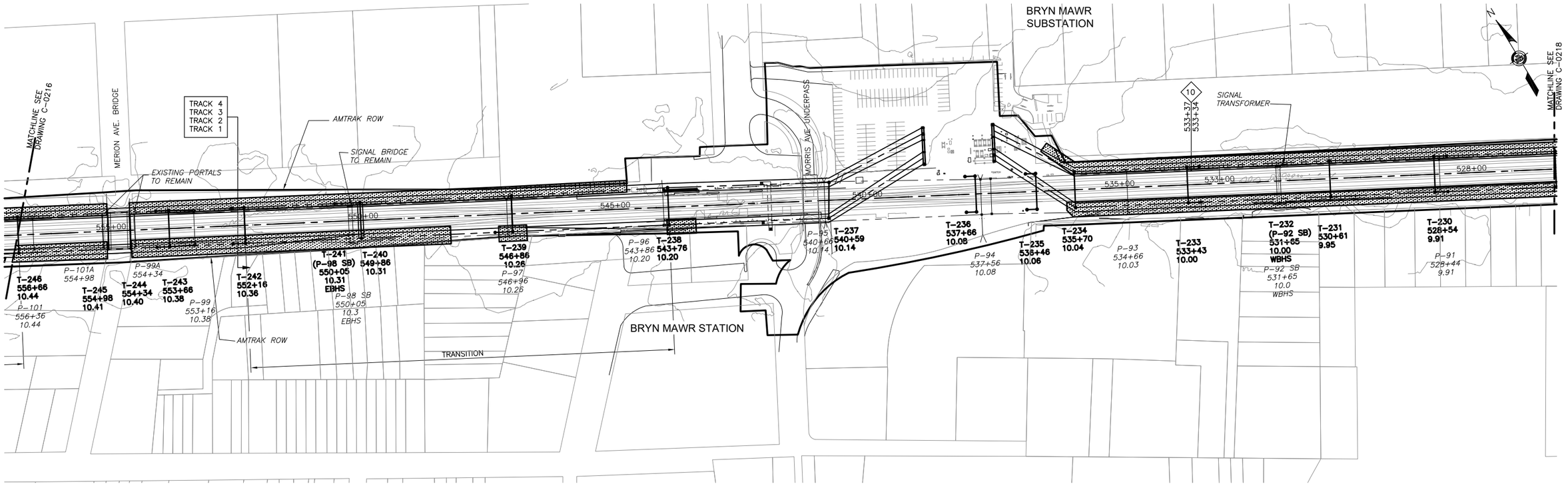
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
STRUCTURAL STEEL – 352 BREAKER INSTALLATION EQUIPMENT MOUNTING DETAILS

Recommended: AJT	Drawn: TAB	Checked: MJM	Date: 03/17/16

File No.:	2011-059-S-5503.DWG
Ref. No.:	2011-059
Sheet No:	334 OF 347

S-5503

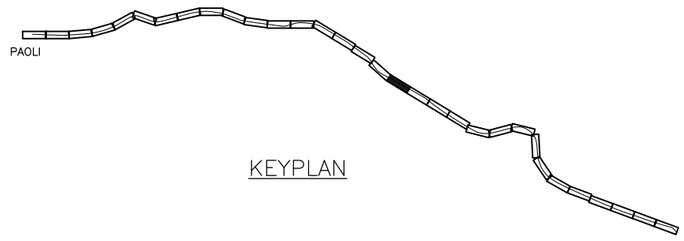
4:19:47 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\heavy structural\2011-059-S-5503.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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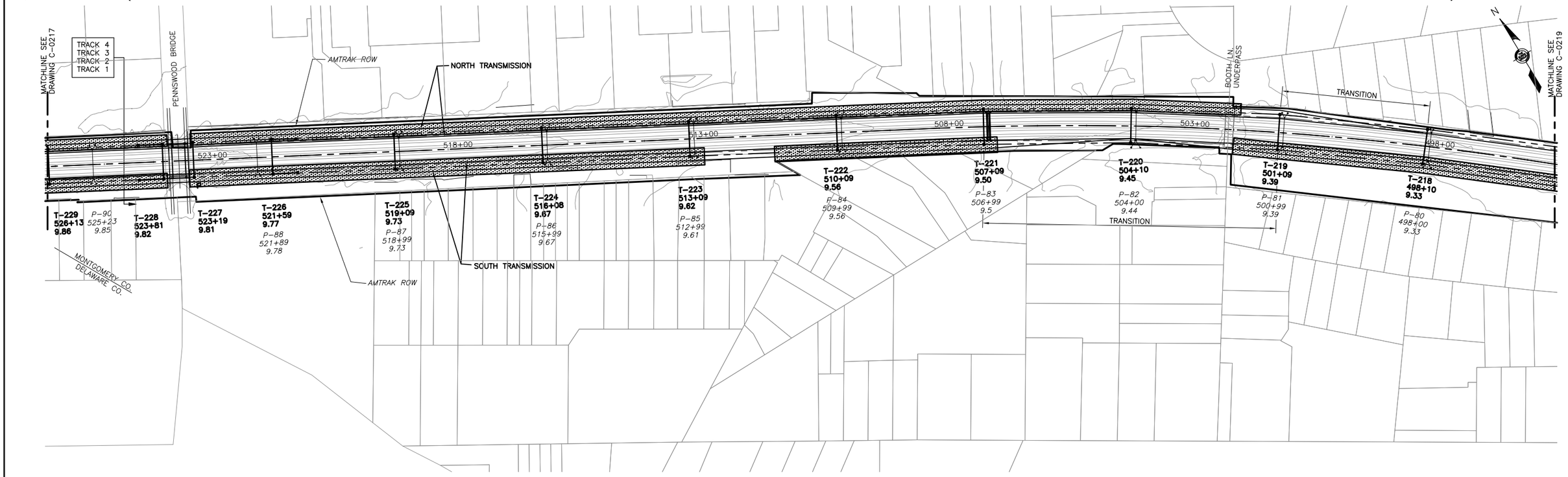
BRYN MAWR TO ZOO TRANSMISSION ELECTRIFICATION
TREE PRUNING
STA. 556+65 TO 526+00

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0217.DWG
Ref. No.:	2011-059
Sheet No:	335 OF 347

C-0217

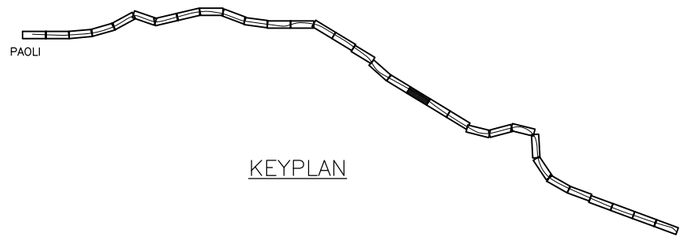
4:29:21 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\civil\c-0217.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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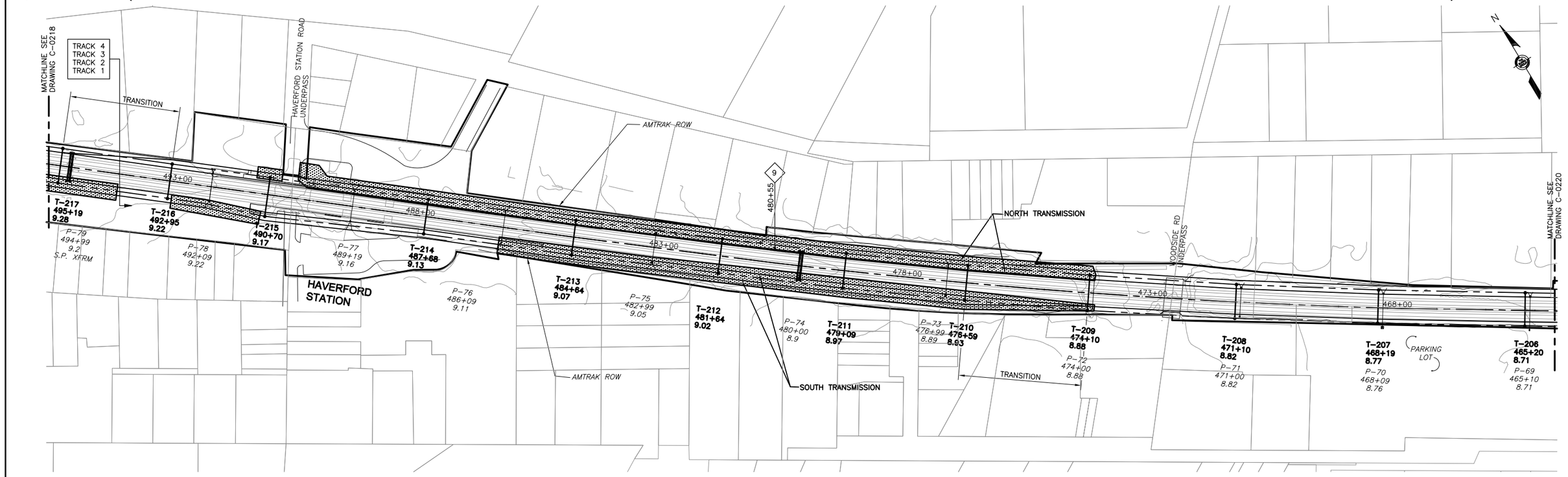
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 526+00 TO 495+50

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0218.DWG
Ref. No.:	2011-059
Sheet No:	336 OF 347

C-0218

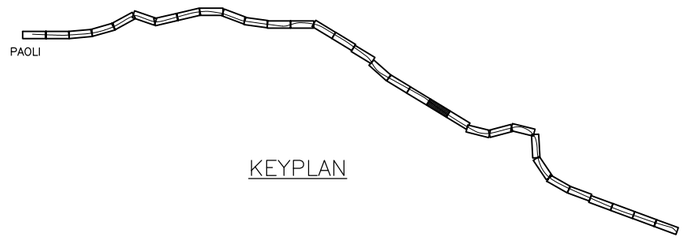
3/14/2016 4:29:35 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\civil\c-0218.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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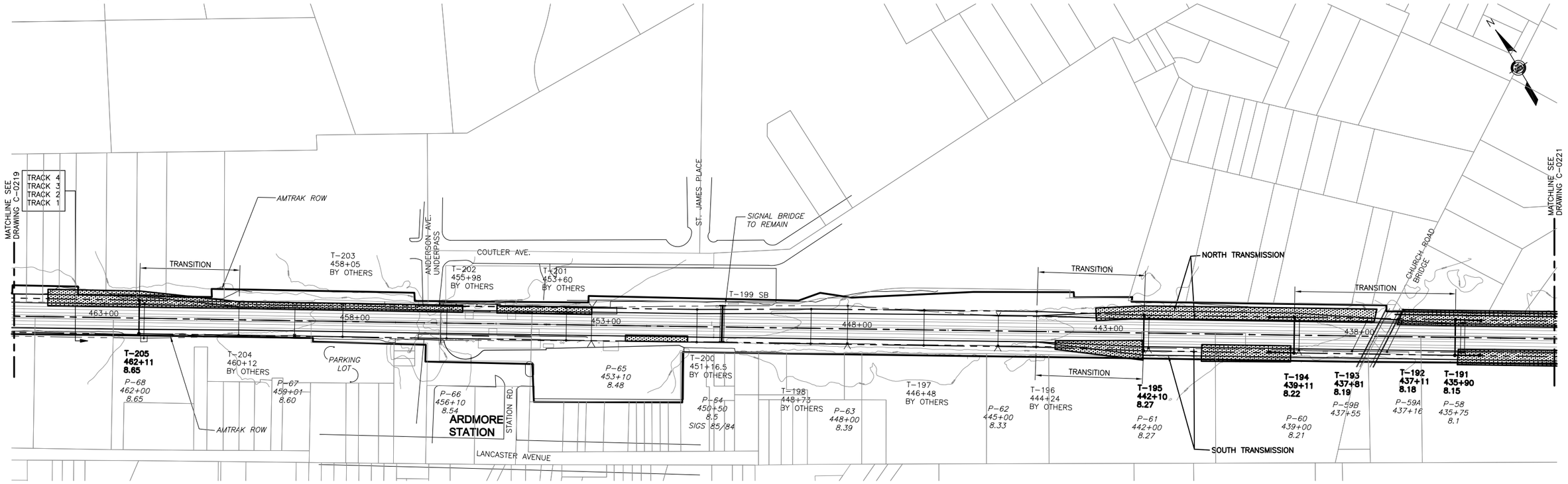
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 495+50 TO 465+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	C-0219.DWG
Ref. No.:	2011-059
Sheet No:	337 OF 347

C-0219

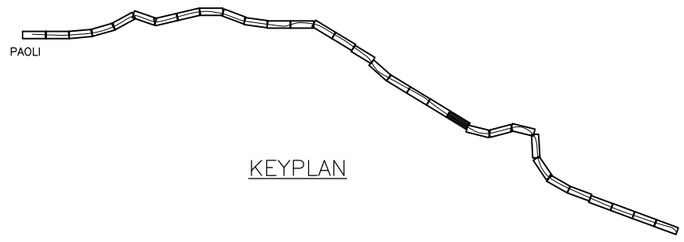
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

PHILADELPHIA

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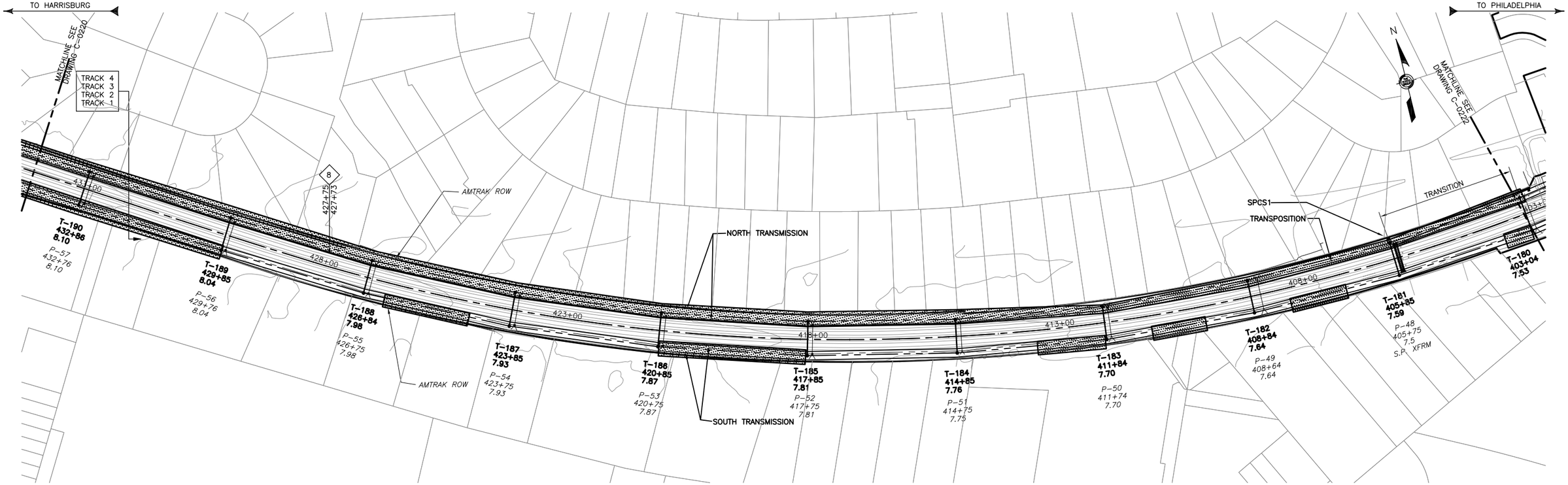
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 465+00 TO 434+00

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0220.DWG
Ref. No.:	2011-059
Sheet No:	338 OF 347

C-0220

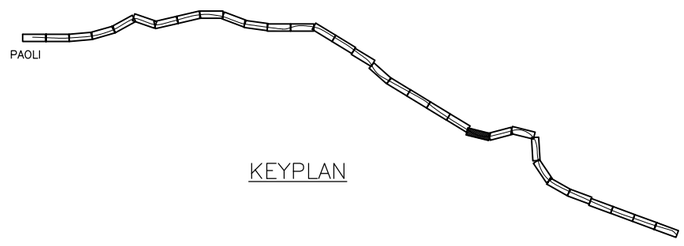
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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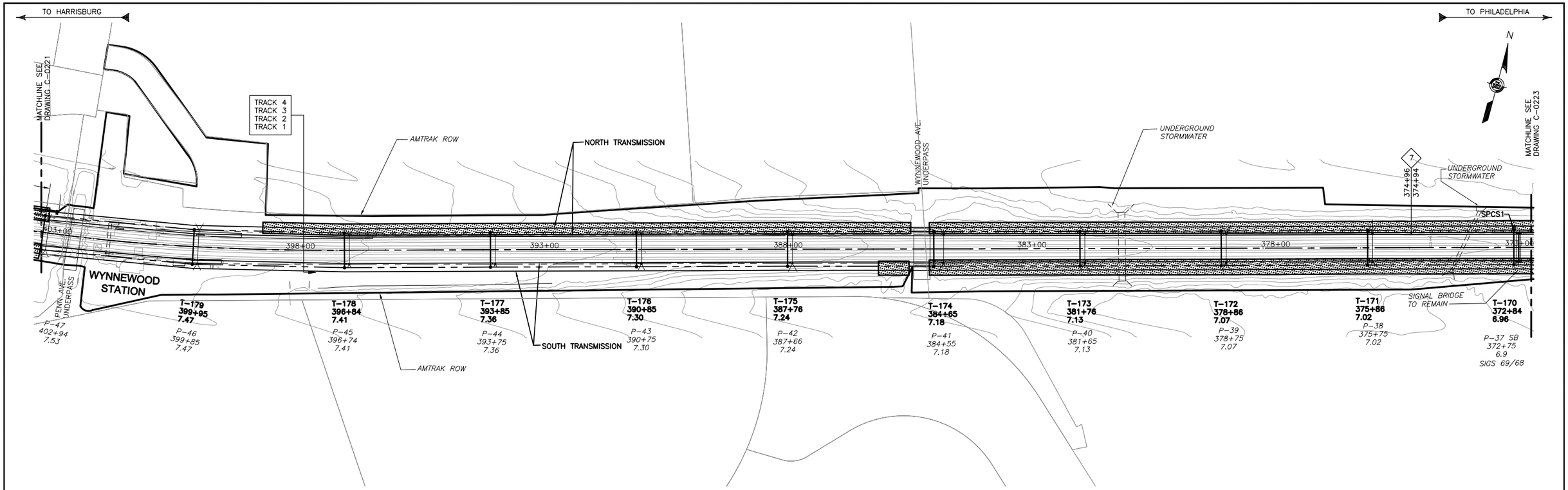
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ELECTRIFICATION
TREE PRUNING
STA. 434+00 TO 403+00

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0221.DWG
Ref. No.:	2011-059
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C-0221

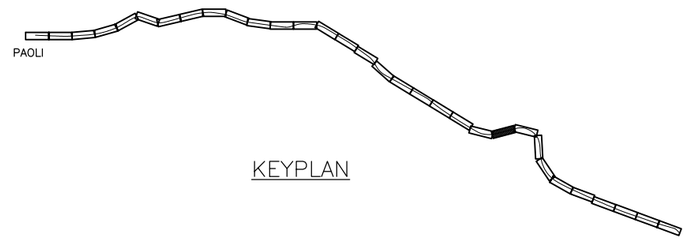
4:30:16 PM 3/14/2016 J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\civil\c-0221.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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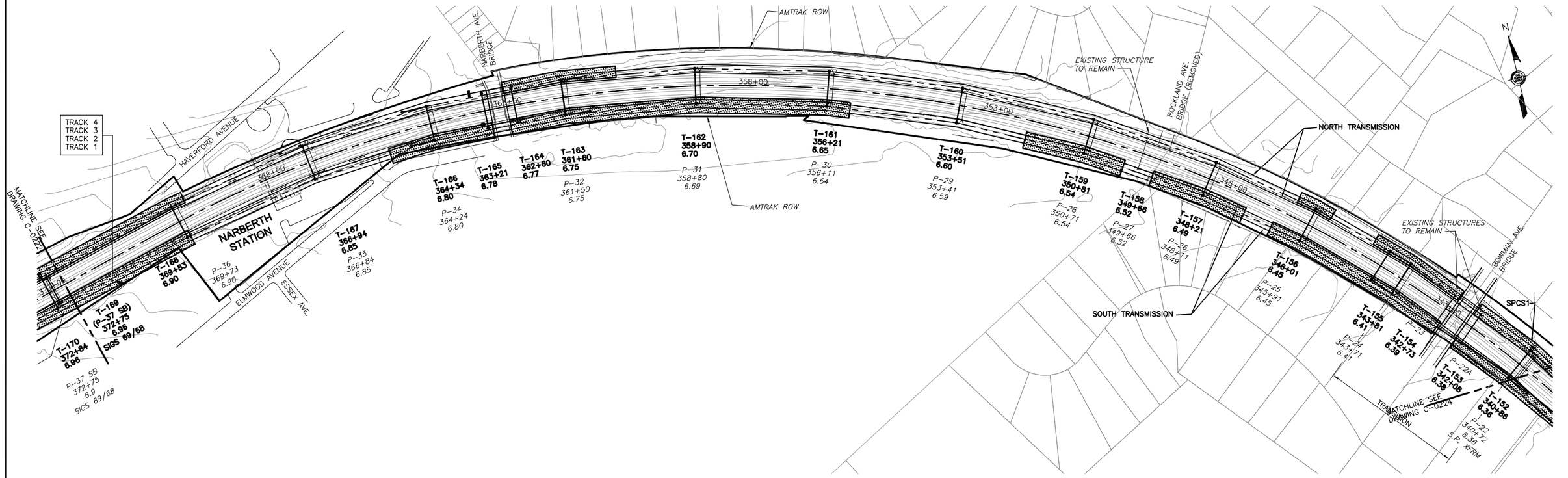
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 403+00 TO 372+50

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	C-0222.DWG
Ref. No.:	2011-059
Sheet No:	340 OF 347

C-0222

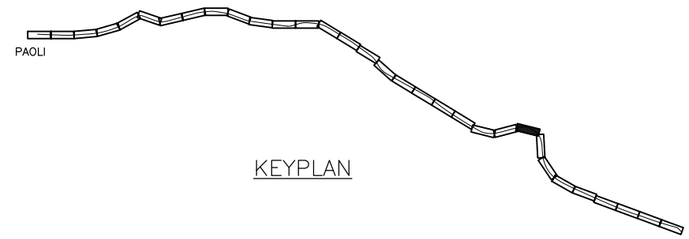
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE: 1"=100'-0"



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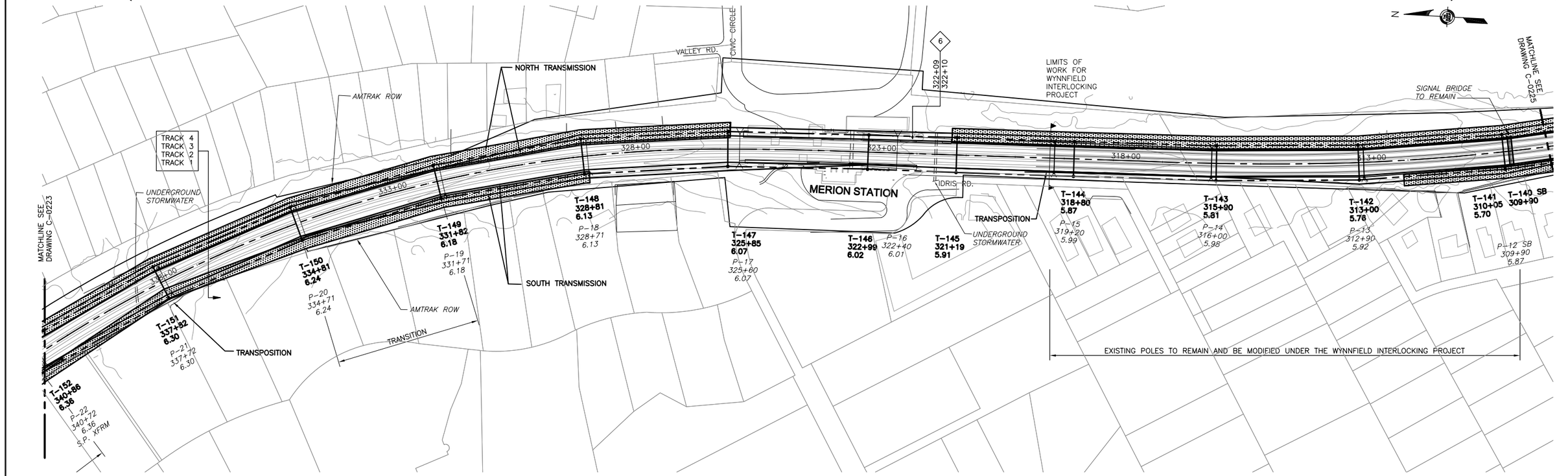
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 372+50 TO 340+70

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	C-0223.DWG
Ref. No.:	2011-059
Sheet No:	341 OF 347

C-0223

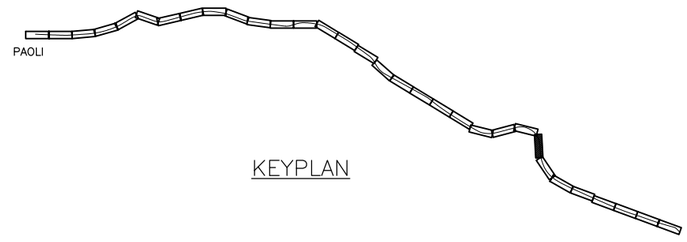
3/14/2016 4:30:48 PM J:\2011\2011-059\Drawings\working drawings zoo to bryn mawr\avi\c-0223.dwg



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



KEYPLAN

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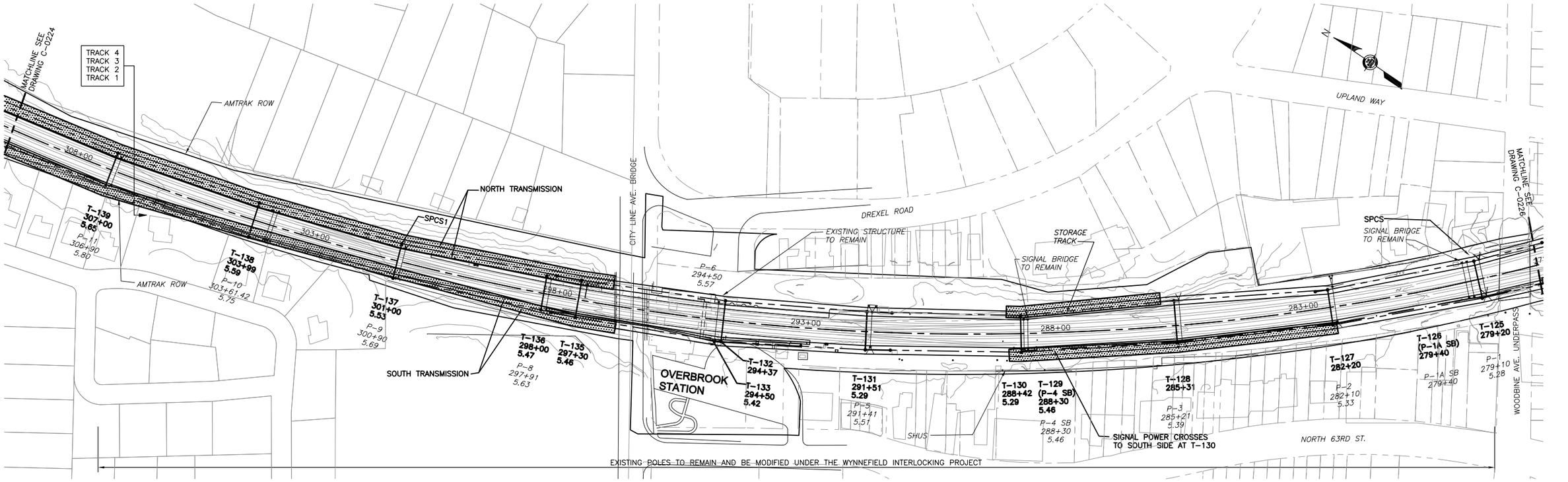
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 340+70 TO 309+00

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0224.DWG
Ref. No.:	2011-059
Sheet No:	342 OF 347

C-0224

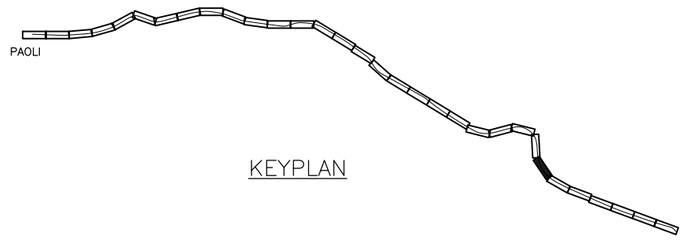
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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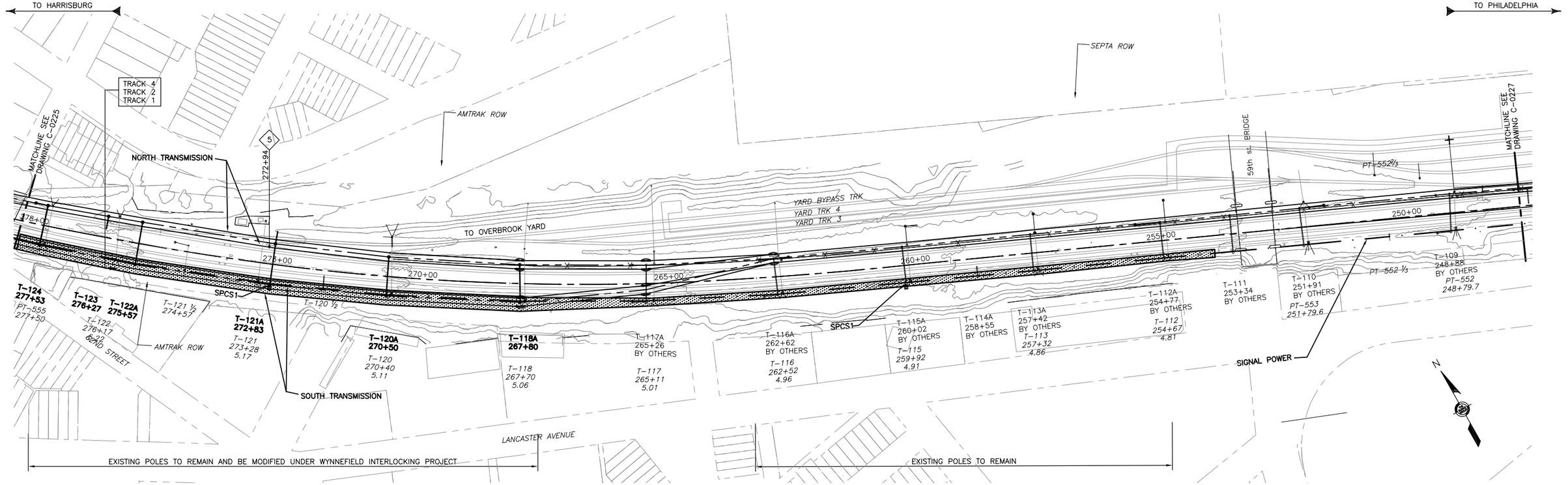
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 309+00 TO 278+00

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

File No.:	C-0225.DWG
Ref. No.:	2011-059
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C-0225

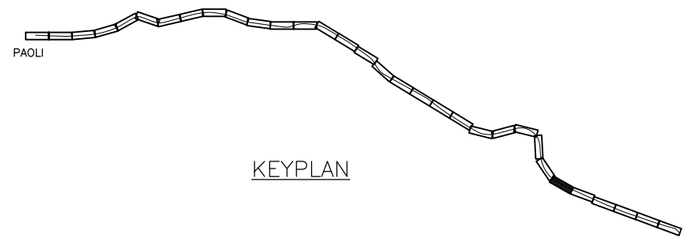
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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TREE PRUNING
STA. 278+00 TO 247+50

Recommended:	DP	Drawn:	VJC	Checked:	RSW	Date:	03/17/16

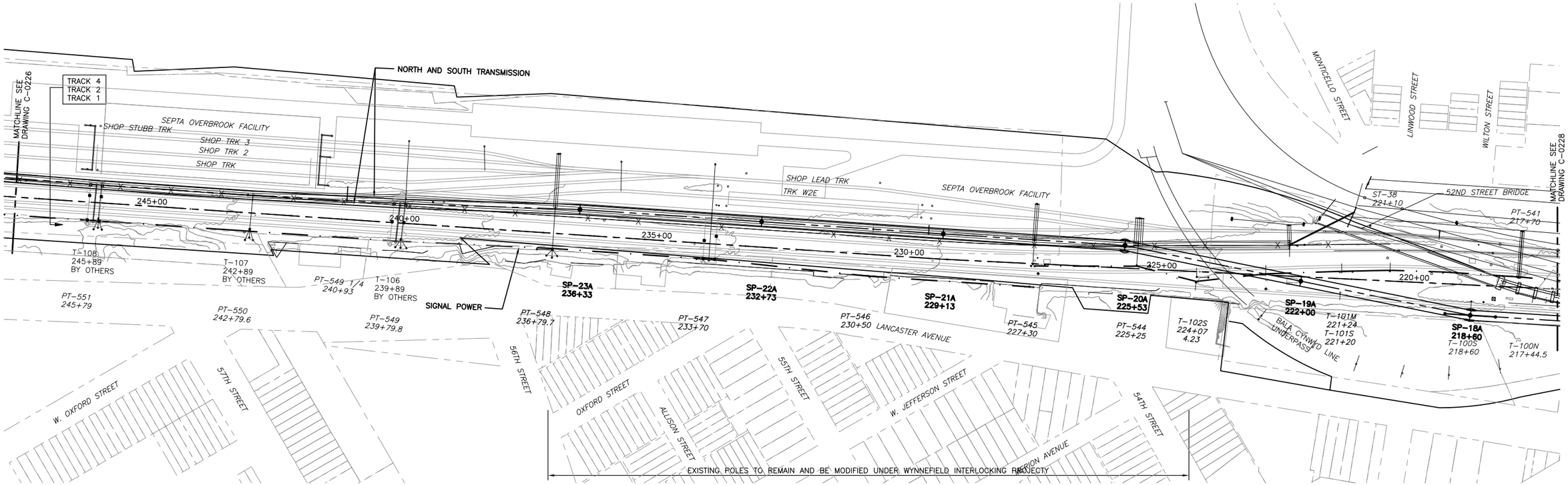
File No.:	C-0226.DWG
Ref. No.:	2011-059
Sheet No:	344 OF 347

C-0226

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TO HARRISBURG

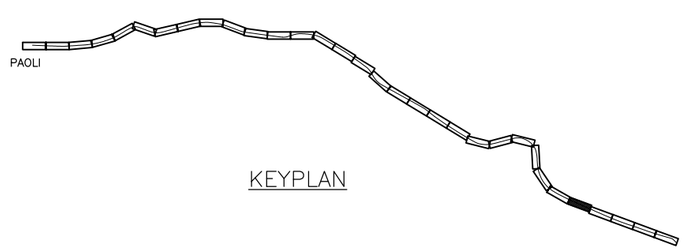
TO PHILADELPHIA



TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE: 1"=100'-0"



KEYPLAN

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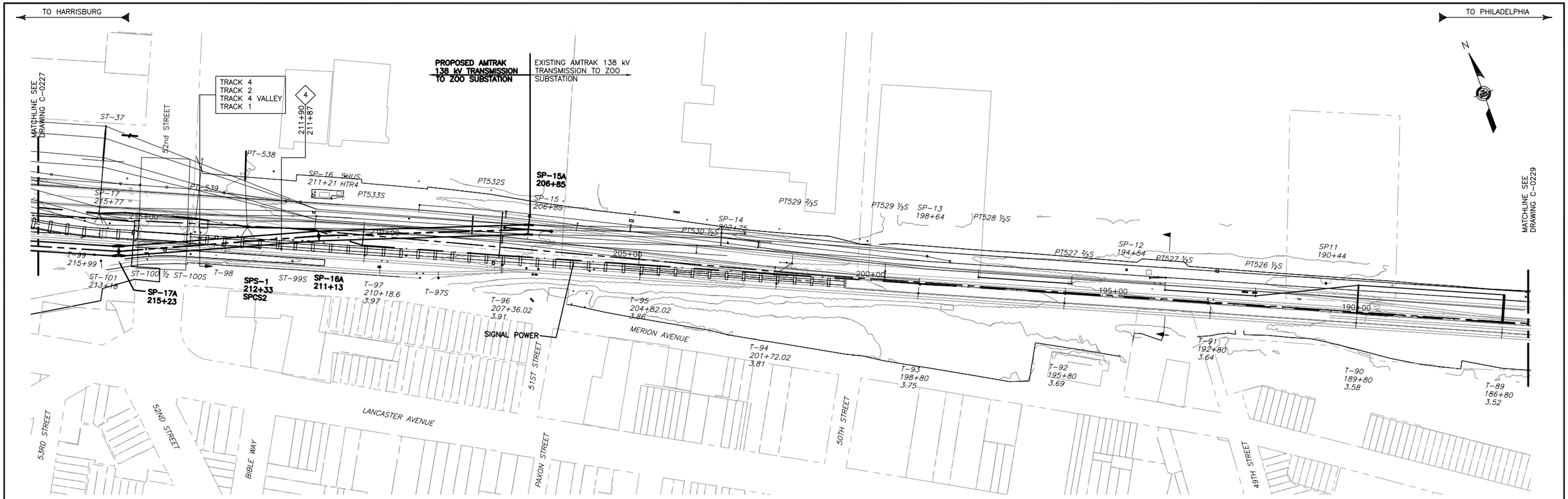
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 247+50 TO 217+00

Recommended: DP	Drawn: VJC	Checked: RSW	Date: 03/17/16

File No.:	C-0227.DWG
Ref. No.:	2011-059
Sheet No:	345 OF 347

C-0227

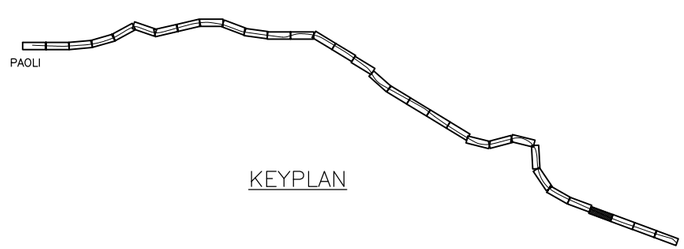
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TREE PRUNING SITE PLAN

100' 50' 0 100'

SCALE:1"=100'-0"



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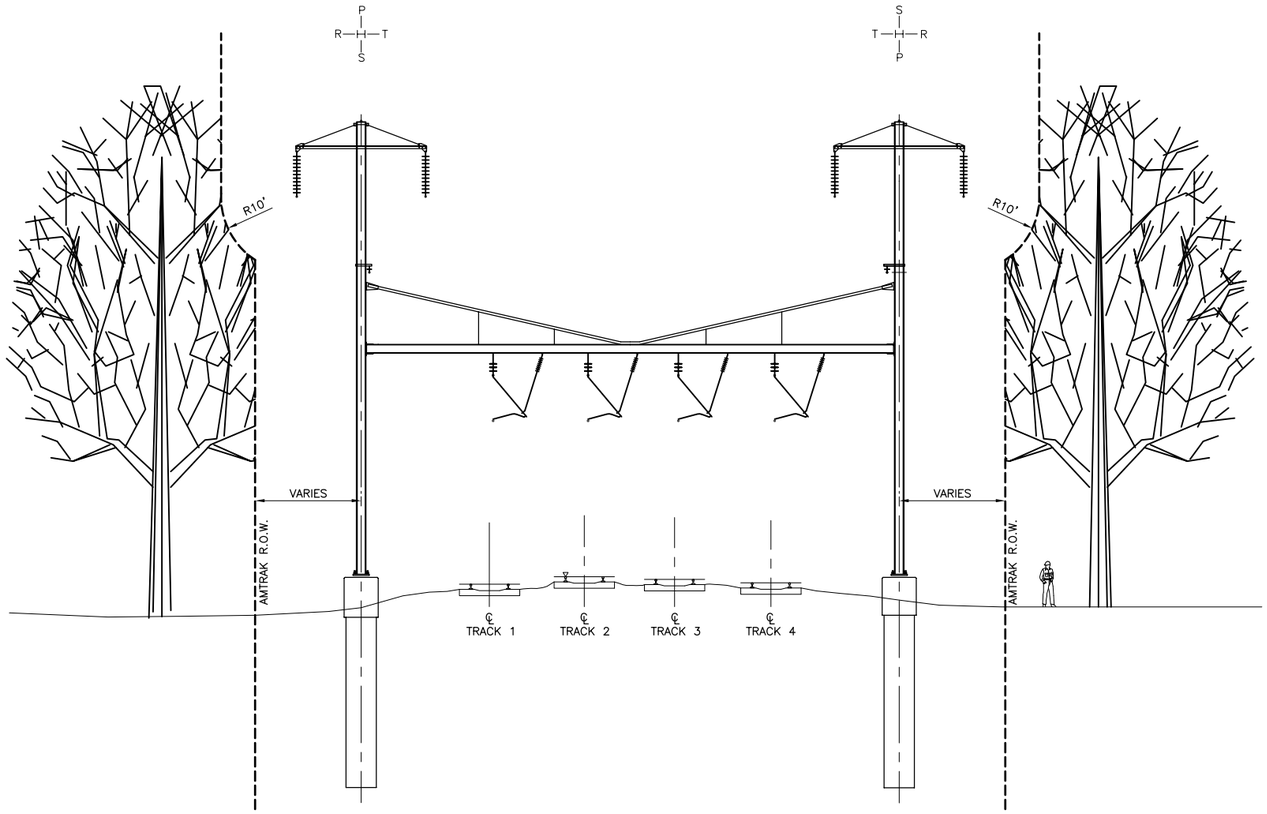
BRYN MAWR TO ZOO TRANSMISSION
ELECTRIFICATION
TREE PRUNING
STA. 217+00 TO 186+00

Recommended: DP | Drawn: VJC | Checked: RSW | Date: 03/17/16

File No.:	C-0228.DWG
Ref. No.:	2011-059
Sheet No:	346 OF 347

C-0228

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4:32:40 PM



TYPICAL TREE PRUNING DETAIL

LOOKING TOWARDS HARRISBURG

0 10 20

SCALE: 1"=10'-0"

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ELECTRIFICATION
TREE PRUNING
TYPICAL TREE PRUNING DETAIL

Recommended:	DP	Drawn:	VJC	Checked:	MJM	Date:	03/17/16

File No.:	C-0232.DWG
Ref. No.:	2011-059
Sheet No:	347 OF 347

C-0232

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